SEVENTH ANNUAL FUEL CONSERVATION NUMBER

The Heating and Ventilating Magazine

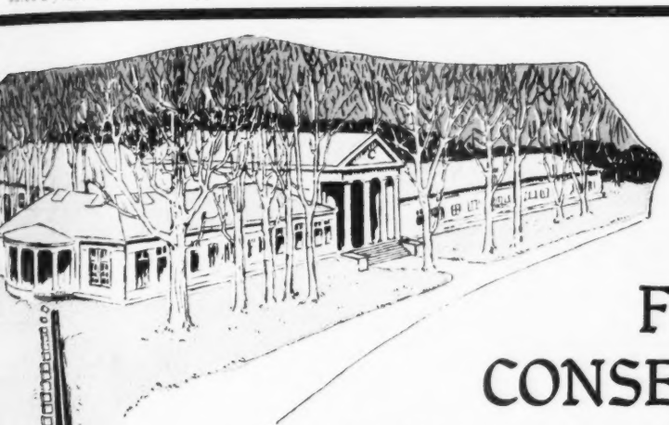
GOOD HEALTH WEEK Oct. 23-30 1922

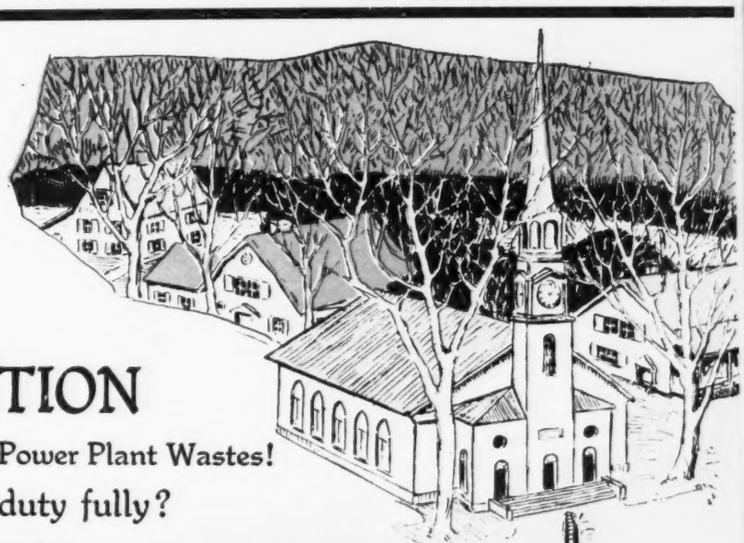
A MONTHLY JOURNAL OF ENGINEERING PROGRESS

Vol. XIX, No. 9
$2.00 a year; 20 cents a copy

SEPTEMBER, 1922

Published at Cooperstown, N. Y.
New York Office, 1123 Broadway



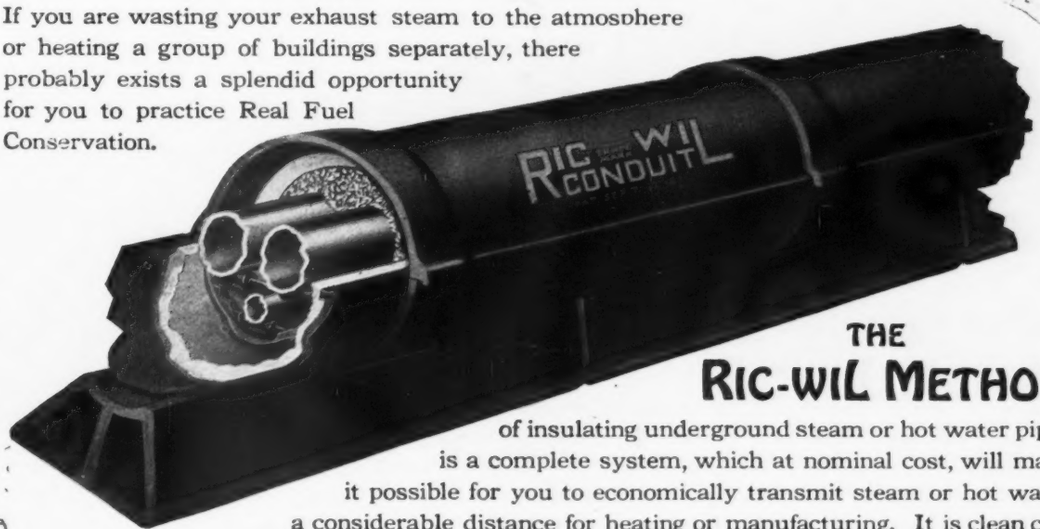


FUEL CONSERVATION

by Economy through the Saving of Power Plant Wastes!

Are you doing your duty fully?

If you are wasting your exhaust steam to the atmosphere or heating a group of buildings separately, there probably exists a splendid opportunity for you to practice Real Fuel Conservation.



THE RIC-WIL METHOD

of insulating underground steam or hot water pipes is a complete system, which at nominal cost, will make it possible for you to economically transmit steam or hot water a considerable distance for heating or manufacturing. It is clean cut, simple, rugged and efficient, with the various units designed and built with a distinct relation to each other and the service they will render.

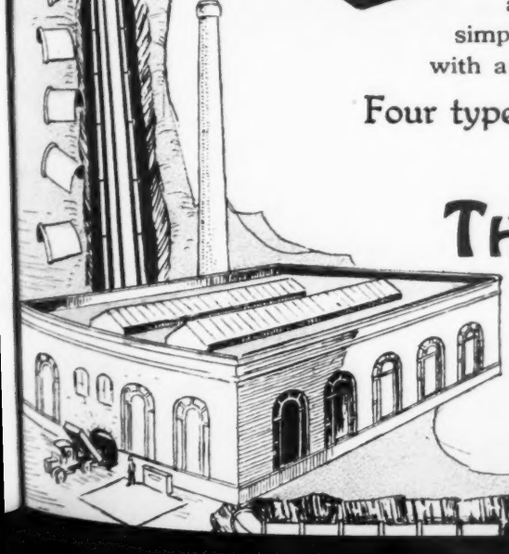
Four types of construction to meet all conditions

Complete catalogue mailed upon request.

THE RIC-WIL COMPANY

CLEVELAND, OHIO

Agents in principal cities.



Selecting the Fan Equipment

PERHAPS, no equipment installed in public buildings is of greater importance than the fan apparatus. Upon the successful operation of the fan system depends, to a marked degree, the health and comfort of many.

In order to best protect the interests of their clients, a large number of architects and heating and ventilating engineers are selecting Clarage Kalamazoo Multiblade Fans. Not only are the Multiblade Fans chosen because of large capacity, low speed and economy of operation, but because, above everything else, this equipment is indeed dependable. Actual installation records bear evidence of this fact.

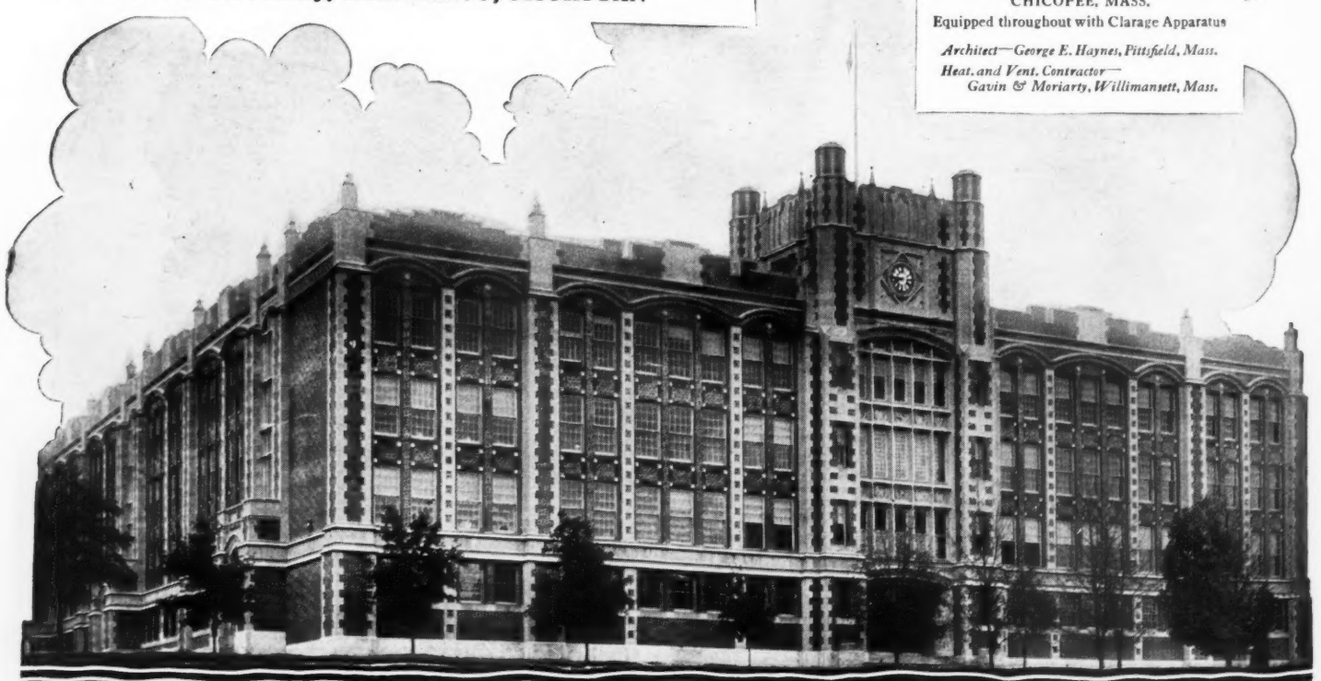
Is it not possible for you to investigate the merits of our equipment? We will be very glad to send you our latest catalog or to have a Clarage engineer call at your convenience.

CLARAGE FAN COMPANY

New York, Philadelphia, Minneapolis, Chicago, Detroit, Boston, Cleveland, Pittsburgh, St. Louis, Los Angeles, Indianapolis

Main Office and Factory, **KALAMAZOO, MICHIGAN**

CHICOPEE HIGH SCHOOL
CHICOPEE, MASS.
Equipped throughout with Clarage Apparatus
Architect—George E. Haynes, Pittsfield, Mass.
Heat. and Vent. Contractor—
Gavin & Moriarty, Willimansett, Mass.



CLARAGE — KALAMAZOO Multiblade Fans

Peerless Unit with front door open showing fans and motor. Front panel and baffle removed, showing special Peerless Vento radiation and humidifying pan.

Peerless Performance

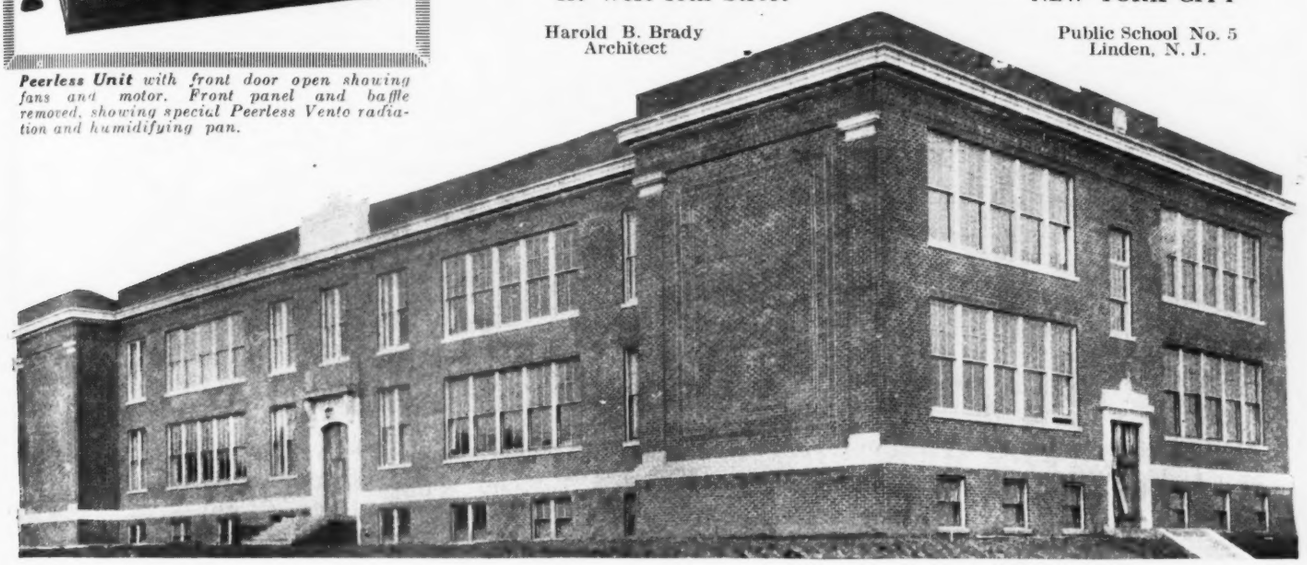
A sturdy Peerless Unit in each room supplying pure, fresh air to the required amount, with perfect distribution and at the right temperature.

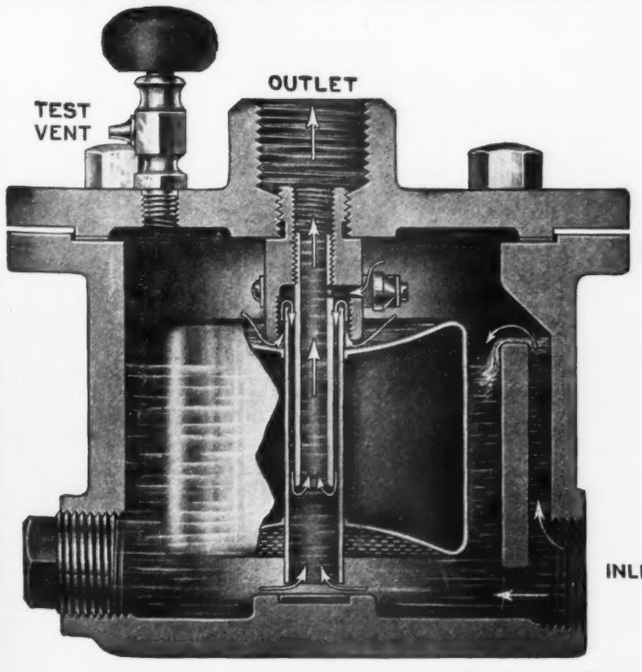
Positive control of room temperature assured by our mixing damper, the best designed for units. Units adaptable to all steam conditions. The ideal system for new and old schools. That's *Peerless* Performance. Send for brochure showing school installations all over the country.

PEERLESS UNIT VENTILATION COMPANY
437 West 16th Street **NEW YORK CITY**

Harold B. Brady
Architect

Public School No. 5
Linden, N. J.





MARSH

DUPLEX WATER SEAL LOW PRESSURE

BLAST TRAP

FOR DIRECT OR INDIRECT COILS OR ANY LOCATION WHERE LARGE QUANTITIES OF WATER ARE TO BE DISCHARGED

Operates automatically either with or without mechanical suction on return line.

No complicated parts to stick or get out of order.

No small openings to clog up with sediment or scale.

Free passage of water—rapid and steady vent of air and passes no steam.

Combined action of flotation for water and all metal thermostatic vent for air together with relief of air through water seal makes the ideal trap for heavy service.

Adjusted and tested at factory and shipped ready for installation, to work automatically from below atmosphere on up to 25 pounds steam pressure.

We Invite Correspondence

JAS. P. MARSH & CO., 118-124 South Clinton Street, Chicago

FOUNDED 1865

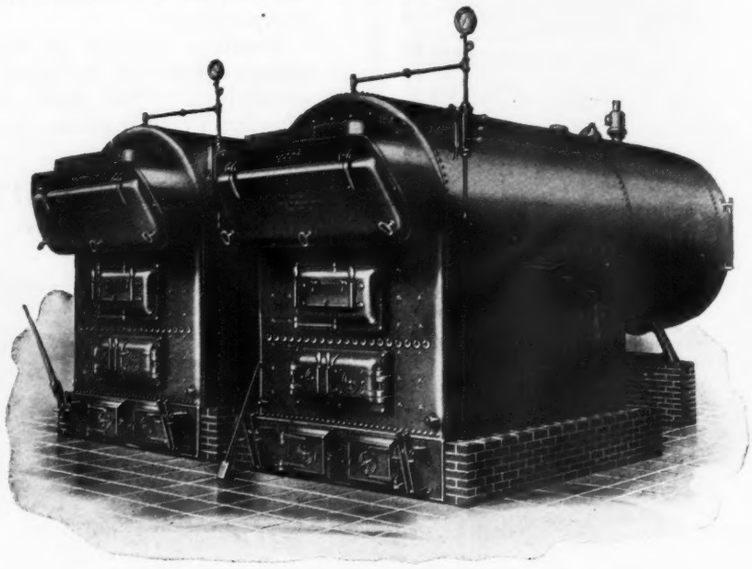
Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents Indicating and Recording Gauges

Agents for Great Britain and Ireland: Chatterton & Co., 30 Fetter Lane, E. C. 4, London
Agents for Dominion of Canada: Taylor-Forbes Co., Ltd., Guelph, Ontario

"Oil City" Boilers for Heating

Return Tubular Portable Firebox

Will burn any kind of fuel,—hard or soft coal, oil, gas or lignite. Note use of high firebox, giving ample combustion area to make possible the use of low-grade fuels.



Why "Oil City" Boilers are Ideal for Heating Work:

These boilers are adaptable for Apartments, Churches, Club Houses, Court Houses, Hospitals, Garages, Hotels, Office Buildings, Large Residences, Post Offices, Schools, etc., because they are Safe, Efficient, Dependable, and, being Self Contained, require little attention.

Circular H-5, H-7, H-12, H-13, gives Full Specifications, Ratings and Weights.

Built of Steel, in Accordance with the A. S. M. E. Code

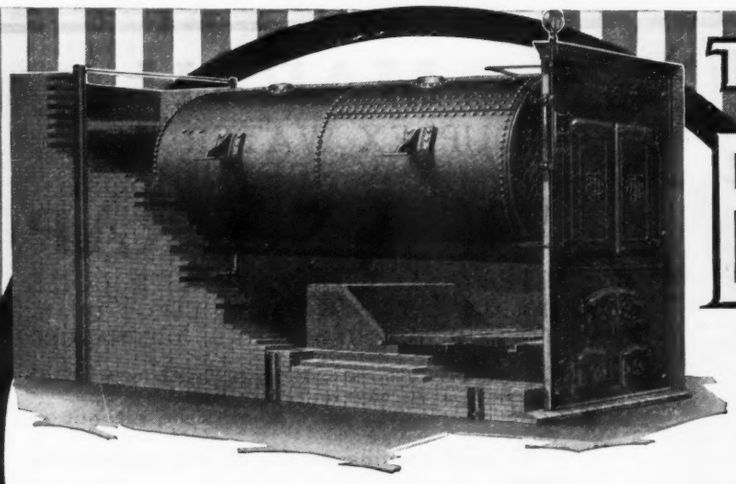
OIL CITY BOILER WORKS, OIL CITY, PA.

BRANCH OFFICES

NEW YORK, 501 Fifth Ave. CHICAGO, No. 1224 Marquette Building PITTSBURGH, House Building

REPRESENTATIVES

CLEVELAND, OHIO PHILADELPHIA, PA. SEATTLE, WASH. BALTIMORE, MD.
SAN FRANCISCO, CAL. ST. PAUL, MINN. DENVER, COL. HOUSTON, TEXAS



TITUSVILLE BOILERS

TITUSVILLE

Horizontal Tubular Boilers for Steam Heating

All materials, bracings, riveting and details of construction are in exact accordance with the A. S. M. E. Boiler Code.

Designed for a maximum working pressure of fifteen pounds to the square inch.
Subjected to a hydro-static test pressure of sixty pounds before shipment.
Our new catalogue giving complete data and specifications will be gladly sent on request.

TITUSVILLE IRON WORKS COMPANY

TITUSVILLE, PA.

Chicago Office 53 W. Jackson Blvd. Buffalo Office 821-823 Marine Trust Bldg. Pittsburgh Office Farmers Bank Bldg. New York Office 152 West 42nd St.

From the SMALLEST to the LARGEST

There is a Kewanee ***Steel*** Boiler just the right size for heating ***every*** apartment building—from the modest two or three apartment building up to the very largest.

KEWANEE BOILER COMPANY

KEWANEE, ILLINOIS

Steel Heating Boilers, Radiators, Tanks, Water Heating Garbage Burners

BRANCHES:

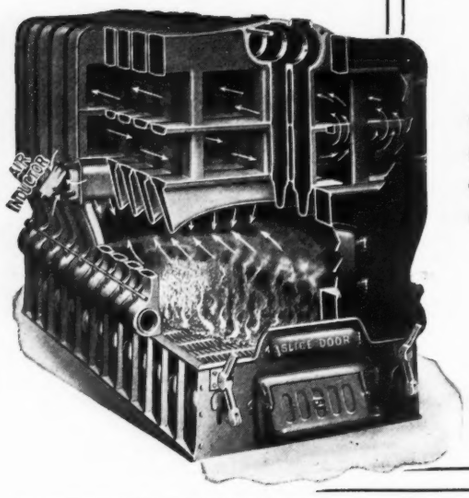
CHICAGO	Market and Washington Sts.	MILWAUKEE	Mer. & Mfrs. Bank Bldg.
NEW YORK	47 W. 42nd St.	PITTSBURGH	945 Oliver Bldg.
DES MOINES	315 Hubbell Bldg.	DENVER	514 Boston Bldg.
KANSAS CITY	2014 Wyandotte St.	DALLAS	Southwestern Life Bldg.
INDIANAPOLIS	509 Occidental Bldg.	DETROIT	1772 Lafayette Bldg.
ST. LOUIS	1212 Chemical Bldg.	TOLEDO	1121 Nicholas Bldg.
MINNEAPOLIS	708 Builders Exchange	CLEVELAND	76 Rose Bldg.
COLUMBUS, O.	808 1st Natl. Bank Bldg.	ATLANTA, GA	1524-25 Candler Bldg.
SALT LAKE CITY	204 Dooly Bldg.	SAN FRANCISCO	72 Fremont St.

CANADIAN REPRESENTATIVES – The Dominion Radiator C. , Ltd.

Toronto, Ont., Montreal, Que., Winnipeg, Man. Hamilton, Ont., St. John, N. B., Calgary, Alta.

KEWANEE

No. S-40-12 Monarch Up-Draft Smokless Boiler showing fire travel, air inductor, primary and secondary combustion chambers. Built in conformity with the Boiler Code of the American Society of Mechanical Engineers and ratings conservatively made in accordance with the Standard Formula of the American Society of Heating and Ventilating Engineers.



Prepare for Any Fuel Shortage

with the

Monarch Up-Draft Smokeless Boiler

The coal crisis holds no terrors for the owners of Monarch Up-Draft Smokeless Boilers. Here is a boiler that will burn without smoke even the cheapest grades of soft coal and if necessary coke, wood, oil or gas with high efficiency and economy.

Speaking of economy, the Monarch Up-Draft Smokless Boiler not only burns soft coal ***Smokelessly*** but effects a saving of 25% to 33⅓%.

HOW IT IS DONE

Smokeless combustion results from a special air inductor located over the fuel bed at the rear of the primary combustion chamber which admits sufficient air to produce a mixture of proper proportions for complete combustion in the secondary chamber. All combustibles are completely consumed before leaving the boiler and all smoke is absolutely eliminated.

Send for catalogue

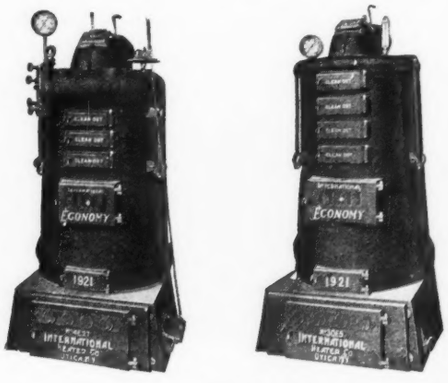
The Wm. H. Page Boiler Company

379 Commercial St. Boston — 141 West 36th Street New York — Builders Exchange Cleveland

"The Distinguished Service Line"

What's in a lump of coal?

The present coal shortage makes this question of vital importance to every consumer.



Economy Round Boilers
Steam, Vapor, and Hot Water Patterns

In every pound of coal there are a certain number of heat units. How economically these heat units are utilized and how many are wasted thru improper combustion, short circuiting of gases, and other causes are matters of boiler design.

These questions are of the utmost importance and interest to prospective buyers of heating apparatus.

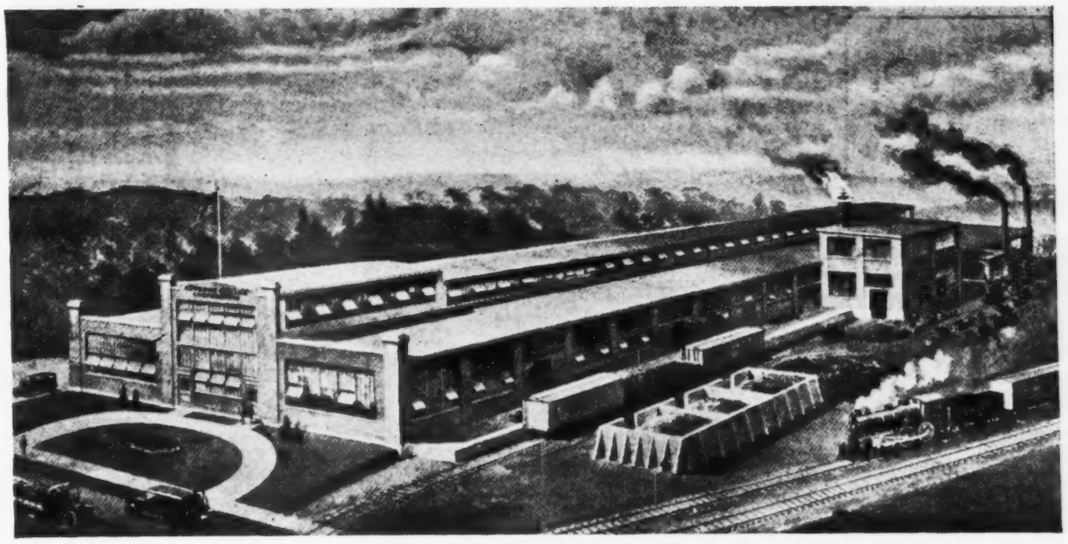
They want the boiler that will produce maximum results from every lump of coal burned, with minimum care and attention.

You can guarantee economical operation by specifying Economy Boilers—*"the boilers that burn the gases as well as the coal."* Balanced design is responsible.

Learn more about Economy Boilers and how to suit them to the job by requesting catalog 1296-H.

INTERNATIONAL HEATER COMPANY, UTICA, N. Y.

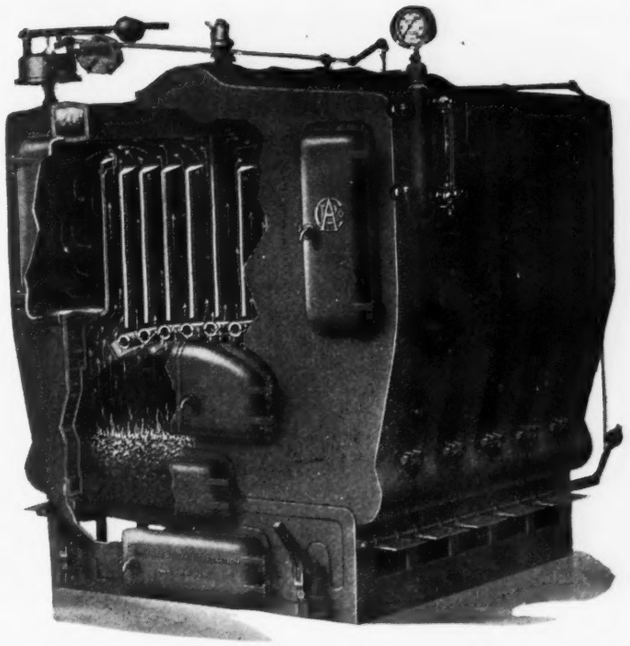
BRANCHES: NEW YORK CHICAGO CLEVELAND NASHUA, N. H.



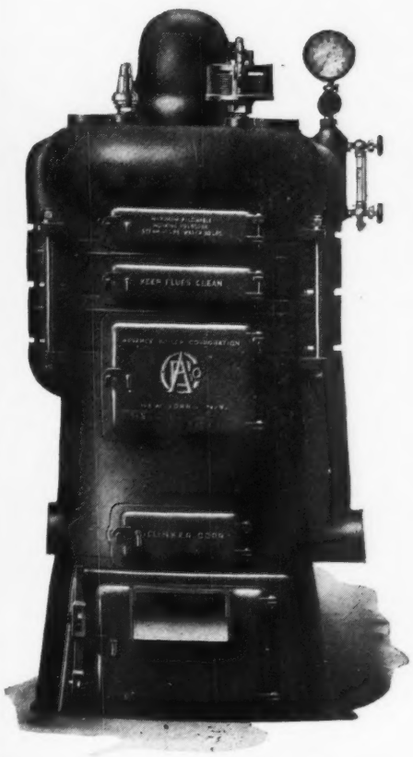
The ABCO Modern Plant in Poughkeepsie, N. Y. with excellent Manufacturing and Shipping Facilities

The Forward March of Advance Boiler Construction

To those interested in Fuel Economy, the study and investigation of ABCO Boilers will prove both instructive and profitable. The Advance Boiler Corporation in presenting the ABCO round, square and sectional smokeless boilers have made rapid strides toward the perfection of boiler construction.



An investigation of the ABCO Boilers will show that 75% of the total water heating surface is *prime radiant heating surface* and 100% of this surface remains efficient always without cleaning. The smokeless feature of the ABCO Boilers is designed as part of the boiler and not as an attached device. The circulation in the ABCO Boilers is perfect and ample steam space is provided.



Start today on the right road and send for ABCO Boiler data. Our new catalog contains a wealth of practical data.

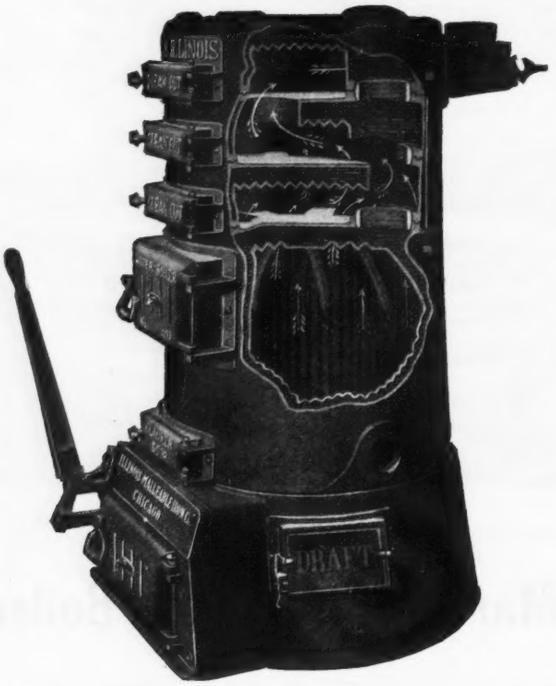
THE ADVANCE BOILER CORP'N

Grand Central Terminal **New York City**

IMICO HEATING BOILERS

For Water and Steam

Various Sizes



Imico Vacuum Heating System

Write For Catalogue

Manufactured by

ILLINOIS MALLEABLE IRON CO. Chicago, Ill.

Pierce Smokeless Boilers

ASK US ABOUT THEM

PIERCE, BUTLER & PIERCE MFG. CORP.

General Sales Office
41 EAST 42nd STREET
NEW YOYK

NEW YORK, N. Y.
437 East 162nd St.
BOSTON, MASS.
312 Congress Street
PHILADELPHIA, PA.
31st and Oxford Streets
WASHINGTON, D. C.
Builders Exchange

NEW LONDON, CONN.
Sparyard St.
BROOKLYN, N. Y.
32 Snediker Ave.
NEWARK, N. J.
600 Ogden St.

WORCESTER, MASS.
32 Foster St.
BALTIMORE, MD.
Builders Exchange
PITTSBURGH
600 Second Ave.

DETROIT, MICH.
Grand River Avenue and Loraine Street
SYRACUSE, N. Y.
282 James St.
PROVIDENCE, R. I.
49 Weybosset St.

A Tribute—

That this beautiful new Park Avenue Baptist Church, New York City, formerly known as the Rockefeller, Fifth Avenue Church, should have the Novelty Carburetor Boiler, is one of the highest possible tributes to this remarkable heating apparatus.

This wonderful boiler is now operating in every type of building in all sections of the country burning all grades and sizes of hard coal or soft coal without smoke. In the self-adjusting carburetor chamber all smoke, gases and carbon, ordinarily wasted, are mixed with oxygen from the air and ignited. Thus greater heat is obtained, less fuel required.

Write for illustrated folder and price list

ABRAM COX STOVE COMPANY

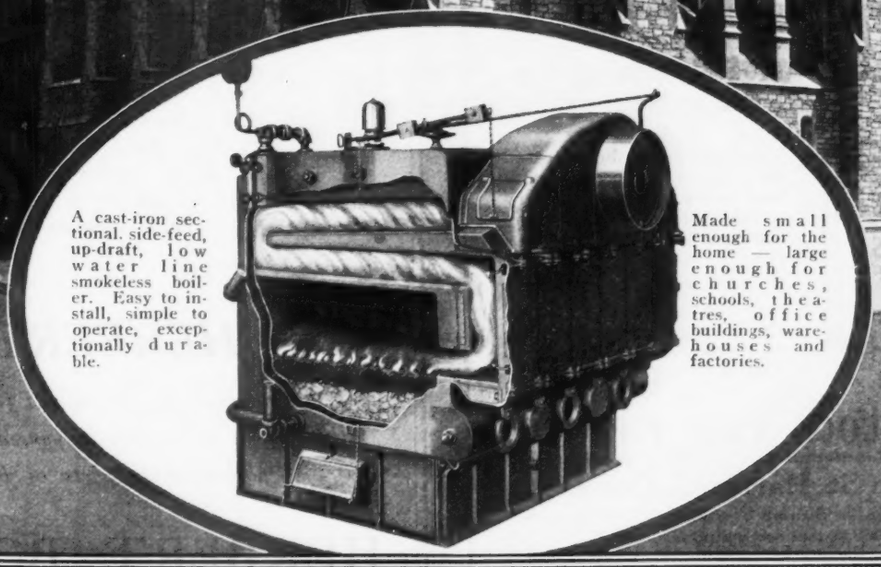
General Offices;

PHILADELPHIA

NEW YORK CHICAGO

ESTABLISHED 1847

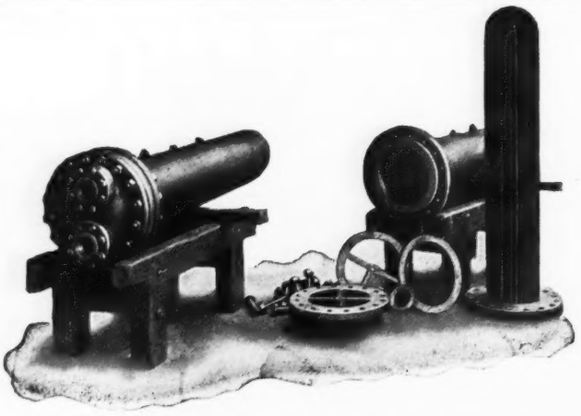
Henry C. Pelton, New York
Allen & Collens, Boston
Associate Architects
H. Hall Marshall,
Heating Engineer
Marc Eidlitz & Sons, *Builders*
T. F. Hall, Inc.,
Heating Contractor



A cast-iron sectional, side-feed, up-draft, low water line smokeless boiler. Easy to install, simple to operate, exceptionally durable.

Made small enough for the home — large enough for churches, schools, theatres, office buildings, warehouses and factories.

1847 **NOVELTY CARBURETOR BOILER** 1922



Whitlock Type R Fuel Oil Heater

THIS type of heater is designed to heat large quantities of oil at high pressures. Capacities range from 1,000 gals. to 15,000 gals. per hour and higher.

The U bend construction cuts the number of expanded joints in half as compared with the straight tube type. No interior bolted joints.

Construction

Shell—Steel pipe, one end rolled in and welded, the other end vanstoned with extra heavy steel flange as shown.

Tube Sheet—Steel

Oil Chamber—Cast Steel

Heating Element—Small size heavy gauge seamless steel tubing securely expanded into the steel tube sheet.

SEE OUR EXHIBIT at the EIGHTH NATIONAL EXPOSITION CHEMICAL INDUSTRIES GRAND CENTRAL PALACE NEW YORK CITY SEPT. 11-16 1922

This heater has been tested both in the laboratory and field under practically every conceivable condition, using oils from 11 to 28 degrees Baume.

Our engineering department has compiled complete data on heating oils. Consult us without obligation.

THE WHITLOCK COIL PIPE CO.

World's Largest Manufacturers of Service Water Heaters

40 South St. Hartford, Conn.

New York Chicago Boston Buffalo Philadelphia

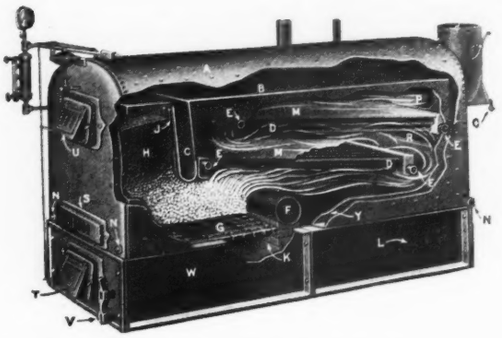
WHITLOCK Heaters are manufactured in Canada by Darling Bros., Ltd., Montreal

WHITLOCK HEATERS

"Have Everlasting Copper Tubes"

INVESTIGATE

The Latest Herbert Magazine Water Tube Smokeless Boiler



These are a few of the Features

(1) No smoke after the fire is thoroughly started. (2) No Flues to clean. (3) Burns Soft Coal Successfully. (4) Carries steam from twelve to fifteen hours with one fire. (5) Has downdraft and direct draft to suit weather conditions. (6) It is all shell surface, which means economy. (7) Can be set in brick, which gives one more return of the hot gases. (8) No Brick Arches or other flimsy devices. (9) Natural draft and the highest economy. (10) Built in steam sizes from 500 square feet to 25,000 square feet

HERBERT

Has combined the downdraft feature with the direct draft and dispensed with the objectionable parts of both.

HERBERT BOILER COMPANY

Root & LaSalle Sts.

Chicago, Illinois

Important Change In Selling Policy

The Combustion Fuel Oil Burner

The Home Fire—That Keeps Burning

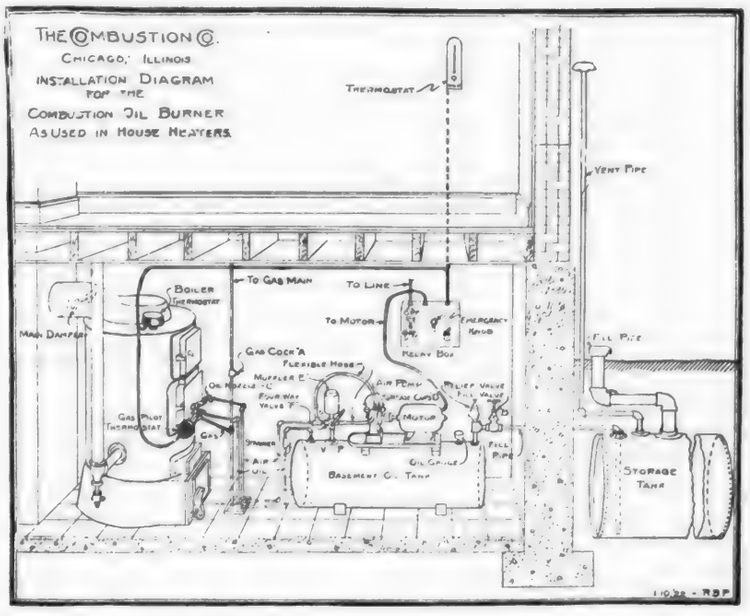
which has heretofore been sold exclusively through the Distributor, will now be sold directly through the heating contractor.

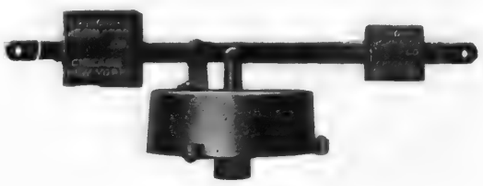
Let us have your inquiry and get in on some of this desirable business. Excellent proposition to dealers.

The Combustion Company

General Sales Office: **728 South Michigan Ave.**

General Office & Factory: **4256 North Western Ave.**
Chicago, Illinois





The New Metaphram Damper Regulator

We Manufacture

A complete system of apparatus for regulation of temperature and humidity for all types of buildings.

National Tank Regulators for the control of hot and cold water in tanks, reservoirs, drinking water systems, etc.

High and low pressure metaphram boiler regulators.

Expansion valves for the control of gas engines, hot water boilers and condensing coils.

Thermostatic controllers for industrial processes, metal melting pots, annealing ovens, kilns, linotype kettles, cookers, dryers, grain dryers, air washers and humidity control, glue pots, etc.

Reducing valves, gauges, thermometers, hydraulic and electric air compressors.

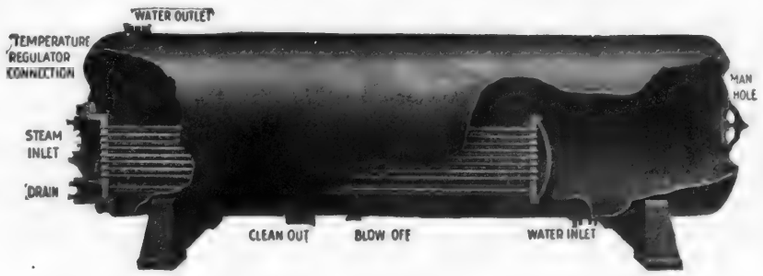
NATIONAL REGULATOR CO.
FACTORY AND GENERAL OFFICES
208-212 South Jefferson Street
CHICAGO

As we studied the requirements of present day low-pressure steam, hot water and vapor heating, we saw a need for a Metaphram Damper Regulator that would be best for medium-large house heating boilers at a price below that of our Type C-7" and with a lift and power greater than those of our 4-inch regulators. As a result we designed our Type B-5½ inch, which offers manufacturers and users a most desirable equipment at a lower price. We added a most important feature in our new Offset Fulcrum, which makes it possible to adjust the lift and power of the lever through a simple adjustment of the staggered fulcrum, as is clearly shown in the accompanying illustration. Specifications: We equip this new Type B-5½" with a 40-inch lever, adjustable weights, two ceiling pulleys and 12 feet of No. 0 plumber's chain. Unlike the 4-inch size, this type has a ½-inch female connection instead of male. Shipping weight: 20 pounds.

TRADE METAPHRAM MARK REG U S PAT OFFICE

Plenty of Hot Water Whenever You Want It—

Russell Storage Heater



Has many advantages that will lighten the burden of high operating cost and which are a decided convenience to the men who operate the plant.

It will deliver large quantities of hot water, heated to the required temperature with the practical minimum in steam consumption. Just the thing for laundries, dye-houses, hotels, apartment houses, institutions, office buildings and power plants.

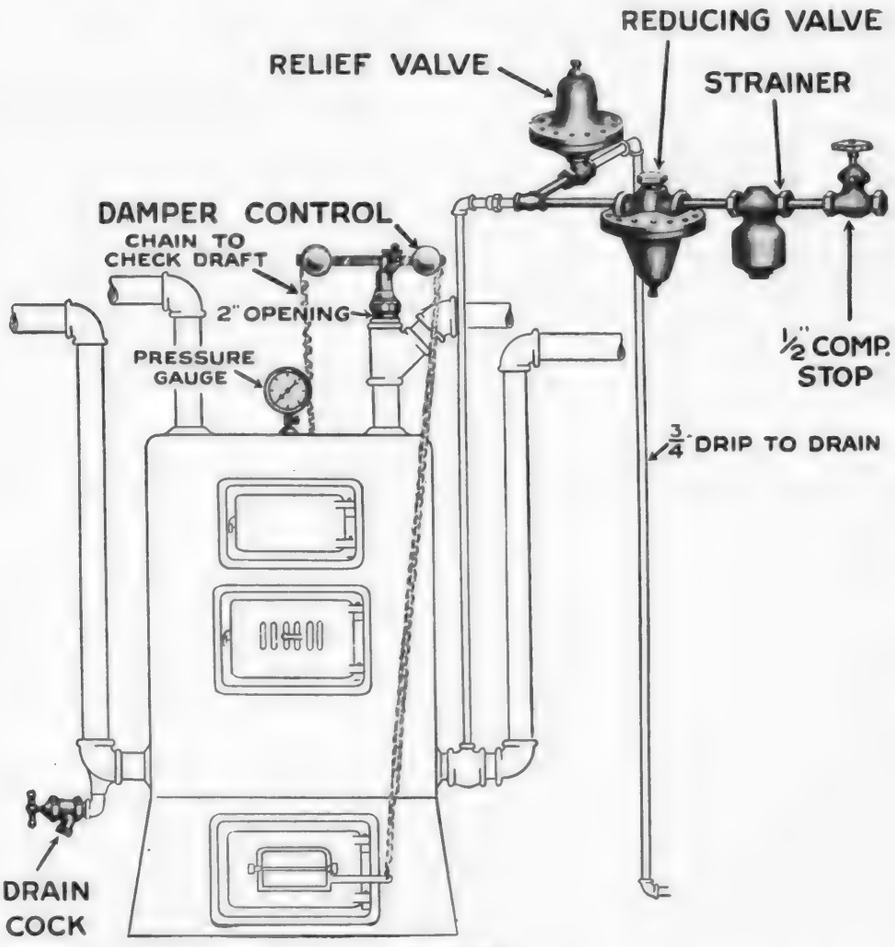
Write for information

THE GRISCOM-RUSSELL CO.

2155 West Street Building, New York

Philadelphia	Pittsburgh	Chicago	New Orleans	San Francisco
Boston	Cleveland	Minneapolis	Houston	Seattle
Hartford	Toledo	Milwaukee	Fort Worth	Los Angeles
Rochester	Detroit	St. Louis	Charlotte	Kansas City
Syracuse	Denver	Salt Lake City		

MUELLER Automatic System—Hot Water Heat Control



(Patented)

No expansion tank, no trouble, no care—operates automatically. Keeps the system filled with water at all times and maintains rapid circulation. Works satisfactorily on any size job.

Comes assembled—quick and easy installation. Good profit for dealers at a price satisfactory to customers.

It will help you to get good heating contracts this fall. Write us for detailed information and prices.

H. MUELLER MANUFACTURING COMPANY, DECATUR, ILL.

New York
145 W. 30th St.

Sarnia, Ont.

San Francisco
635 Mission St.

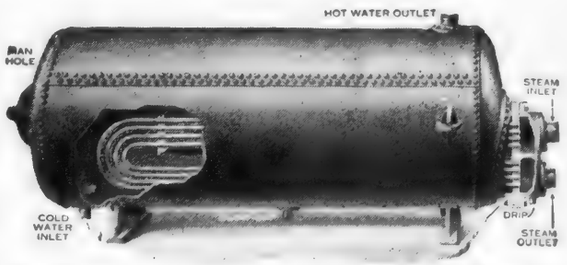
'100 Sq. Ft. of Heating Surface'

in the *Patterson Heater* means just exactly what it says

The heating surface is a nest of single '∩,' or hair pin, tubes each free to expand and contract without harmful strains.

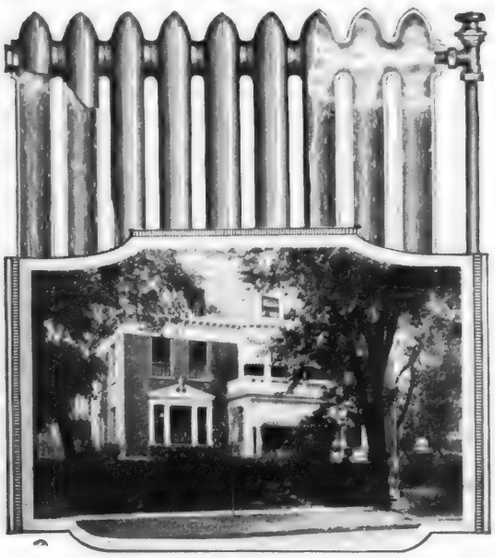
Each tube drains instantly and no trapped water can condense incoming steam thereby greatly reducing the effective heating surface.

Every Sq. Ft. of Heating Surface in The Patterson is effective and 100% efficient.



The Patterson Combined Hot Water Service and Storage Heater with single, self draining, pure copper '∩' tubes.

Patterson-Kelley Co. 107 East 40th St. New York



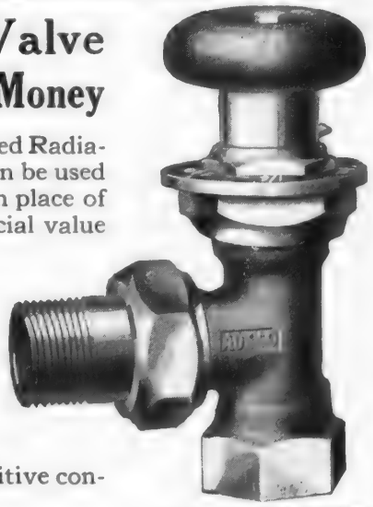
Residence of Mr. Robert Sinclair, Cedar Rapids, Ia., in which hot water system was changed to Adsco Heating.

Write for Bulletin No. 158-H *covering Adsco Heating, for individual buildings, and including the Adsco Specialties; Bulletin No.* 20-H *covers Adsco Community Heating of a group of buildings from Central Station Steam Plant. Architects, engineers and contractors should also ask for Bulletin No.* 159-H.

HOW The ADSCO Valve Controls Heat—Saves Money

THE Improved Adsco Graduated Radiator Valve—PACKLESS—can be used with any steam or vapor system in place of any ordinary valve. It is of special value when used with other Adsco Specialties in Adsco Heating with any make of boiler.

Full nickel plated—index fingers nickeled on black dial. Hand wheel always moves freely, yet valve never leaks — never requires packing. The two pieces —non-rising stem means more positive control and greater durability.



Adsco Graduated Packless Radiator Valve

The Adsco Valve and other Adsco Specialties are sold to the trade at uniform prices, as merchandise —not as a part of an engineering specification.

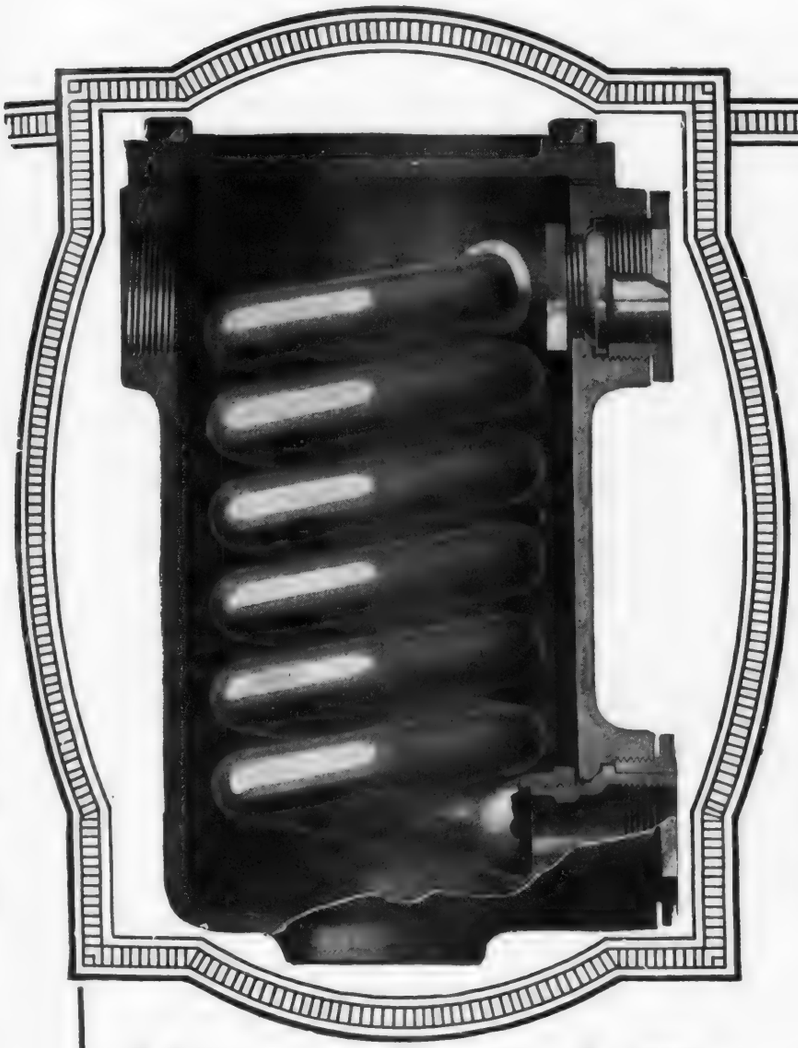
Architects and contractors can secure our engineering service on Adsco Heating at a moderate fee, without influence on cost of specialties required.

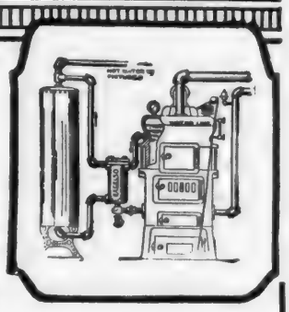
AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

OFFICES: NEW YORK CHICAGO SEATTLE PITTSBURG

ADSCO HEATING





Watch for Ads like shown below appearing every other week in *Saturday Evening Post*, and every month in American and Good Housekeeping Magazine.

for HOT WATER
DURING THE HEATING SEASON
This Book Tells The Story
Use Excelso method attached to your heating plant. Plenty of hot water twenty-four hours a day. Requires no attention. Send for free booklet; give name of plumber and state kind of heating used.
EXCELSO SPECIALTY WORKS
444 EXCELSO BLDG., BUFFALO, N. Y.
EXCELSO WATER HEATERS
Sold by All Plumbers and Steamfitters

Creating More Satisfied Customers For You

Specify the Excelso Water Heater because it guarantees abundant hot water with

No Gas Bills During the Heating Season

Eliminates troublesome fire-pot coils. Patented ground joints prevent leaks.

Connects on outside of steam or vapor heating boiler. Easy to install and requires no attention.

Excelso Hot Water Heaters are sold and endorsed by all the leading boiler manufacturers.

American Radiator Co.	United States Radiator Corp.
Richardson and Boynton Co.	International Heater Co.
Richmond Radiator Co.	Boynton Furnace Co.
Standard Heater Co.	The Wm. H. Page Boiler Co.
Utica Heater Co.	Gurney Heater Mfg. Co.
Burnham Boiler Corp.	Thatcher Furnace Co.
Pierce, Butler & Pierce Mfg. Co.	Abendroth Bros.

Monitor Bi-Loop Radiator Co.

Also by plumbing and heating jobbers everywhere.

Learn of the many economical features of this nationally advertised Heater by writing for our new booklet. Dealers eveywhere.

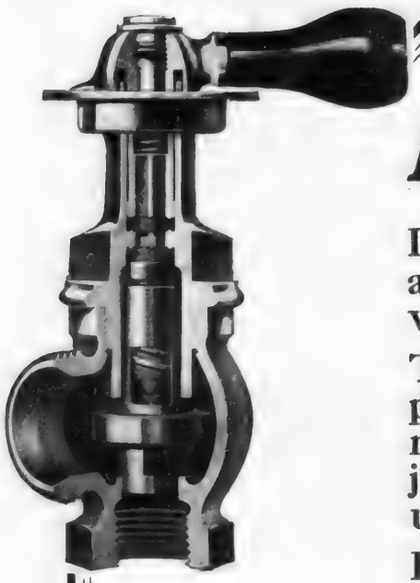
Excelso Specialty Works, 117 Excelso Bldg., Buffalo, N. Y.

Special New York Sales Representative JOHN G. KELLEY, 137 East 43rd Street

New England Representative DANIEL L. HANSON, 46 Cornhill Boston, Mass.

EXCELSO WATER HEATERS

Sold by All Plumbers and Steamfitters



They work well Because made well

Lavigne Packless Steam Radiator Valves are distinctly different from ordinary valves, and more efficient.

The construction is simple and trouble proof, as the illustration shows. The mechanism is protected from external injury on account of the bonnet extending up under the handle holder.

Particular care is taken in the manufacture and inspection of every part, guaranteeing that nothing will go wrong in service.

LAVIGNE

PACKLESS STEAM RADIATOR VALVES
LEAKLESS—PERFECT PERFORMANCE

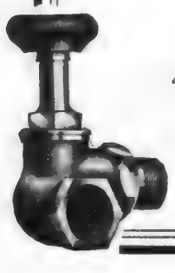
Our complete range of styles and sizes satisfies every requirement for Vapor, Vacuum, Central Station or Low Pressure Steam Heating Systems.

Their record of never-failing performance on hundreds of systems—vapor, vacuum, central station and low pressure—is your surety of self—and customer—satisfaction.

Made in Angle, Globe, Right or Left-hand Corner styles; furnished with Round Wheel or Plain Lever Handle, Graduated Dial with Lever Handle or Round Wheel, extension type with Lever Handle or Round Wheel. Also Lock Shield, either Plain or Graduated.

BUILT RIGHT—TO STAY TIGHT
Your Jobber can supply you

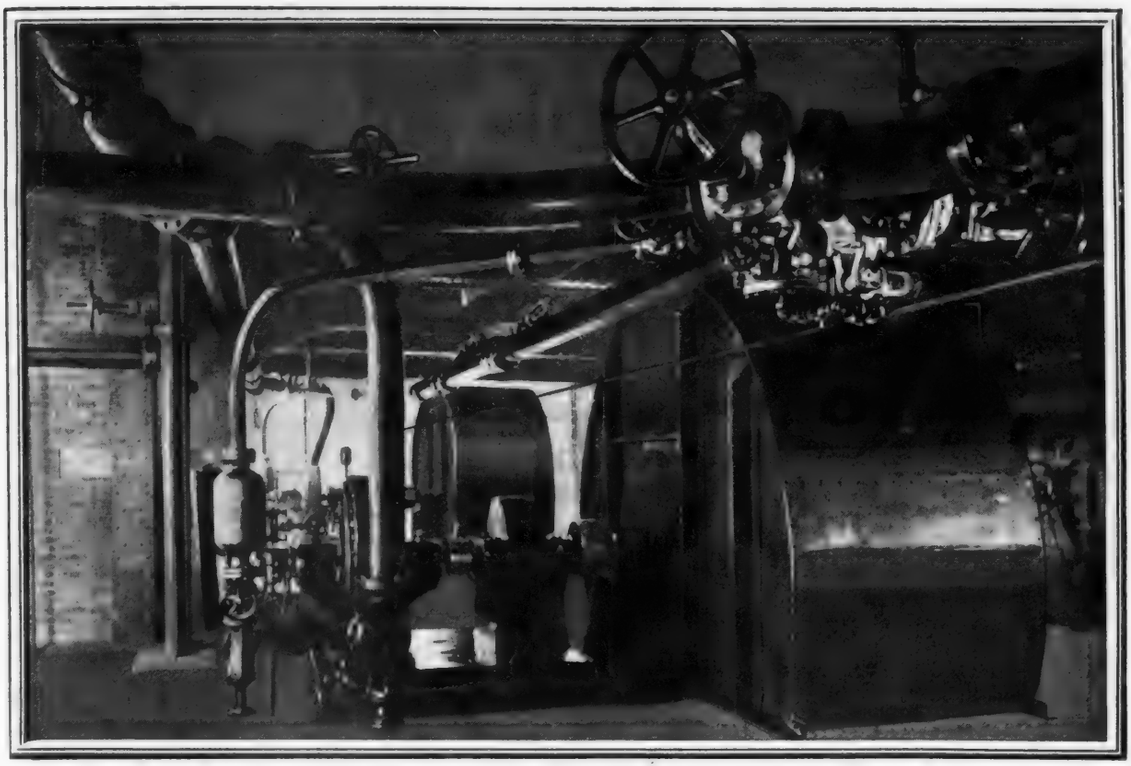
COMMONWEALTH BRASS CORPORATION
DETROIT **MICHIGAN**



NEW YORK
48 E. 41st Street

CHICAGO
332 So. Michigan Avenue

SAN FRANCISCO
68 Post Street



FAN ROOM, KELLY-SPRINGFIELD TIRE PLANT, CUMBERLAND, MARYLAND, CRANE EQUIPPED

CRANE OIL AND STEAM SEPARATORS

Crane oil and steam separators mechanically eliminate oil and water from exhaust steam — thus conserving the strength and serviceability of the boiler.

CRANE

GENERAL OFFICES: CRANE BUILDING, 836 S. MICHIGAN AVE., CHICAGO

Branches and Sales Offices in One Hundred and Thirty-five Cities

National Exhibit Rooms: Chicago, New York, Atlantic City

Works: Chicago and Bridgeport

Announcing

The first and only automatic air valve of the thermo-metal type

A better air valve has been made and it is the

RUSSELL THERMO-METAL NON-ADJUSTABLE NO. 7

Quick to respond to the presence of air steam or moisture

Positive in Action

Rapid in Operation

Superior in Appearance

The Russell Thermo-Metal valve has been subjected to months of practical use under every conceivable unfavorable condition purposely created and is now guaranteed for ten years to give that perfection of performance claimed for it.

Write for literature and prices.

The air valve without volatile liquid and pressure in the float to bulge a diaphragm. The operating element is a strip of thermostatic metal composed of two thicknesses of different metals welded together having very different coefficients of expansions, i. e., one expands much more rapidly from heat or contracts more from cold than the other. Result: a strip of such a combination of metals changes in shape with changes of temperature, straightening or curving more as the case may be.

Quick and complete drainage is insured by completely separate passages for water and air or steam. Opposition of these different elements is therefere avoided.

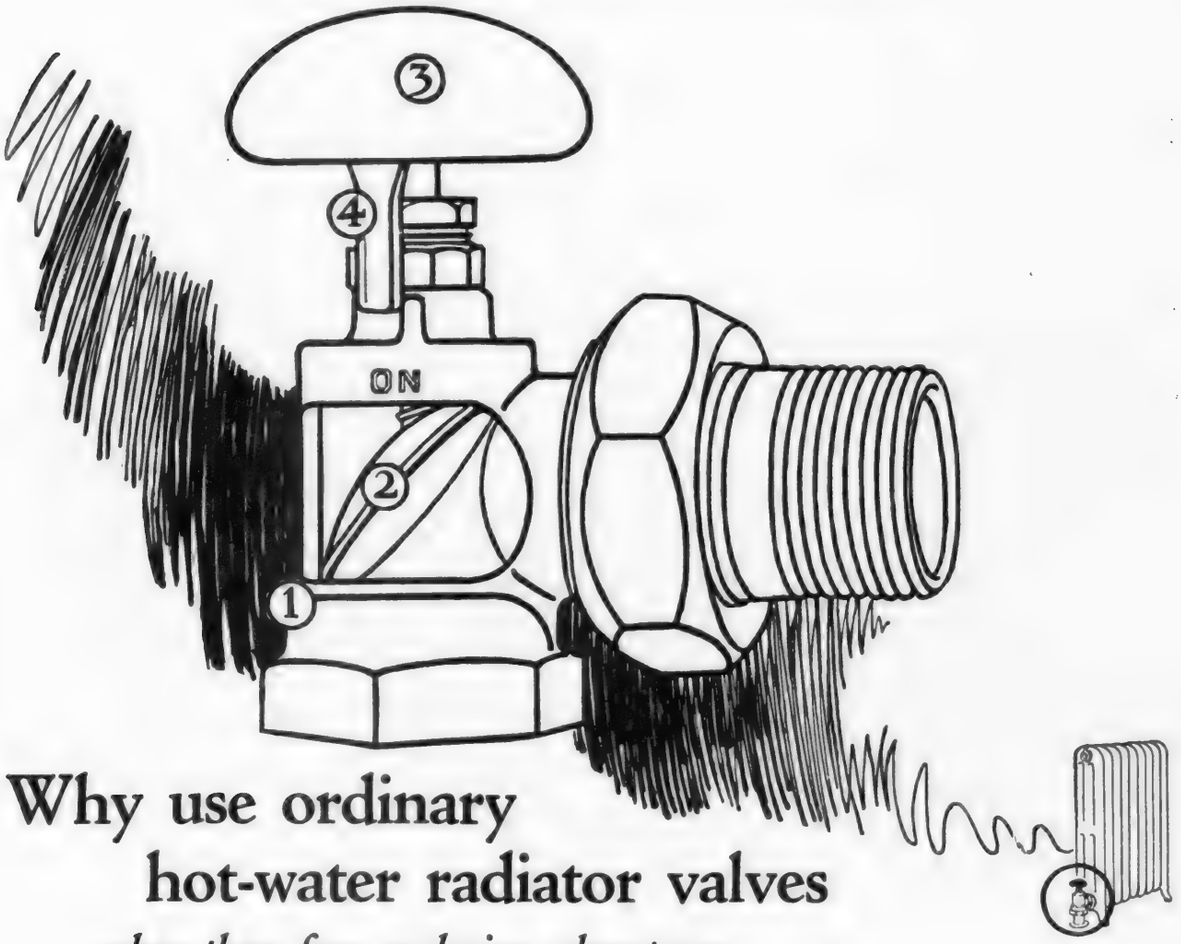
Russell Thermo-metal Non-Adjustable No. 7 **Automatic Air Valves**

W. A. RUSSELL & COMPANY
Grand Central Terminal Building
NEW YORK CITY

CHICAGO
332 So. Michigan Ave.

ST. LOUIS
706 Security Building

BOSTON
46 Cornhill Street



Why use ordinary hot-water radiator valves

—*when these four exclusive advantages cost not one cent more?*

WHY take a chance on making a careful installation and then having a faulty job? Catch the trouble where most of it happens—*at the valves*. Investigate this new Genuine Detroit Hot-Water Radiator Valve, made by the largest makers of radiator valves in the world. Note these four distinctive advantages:

1 The curved inlet plate has less than one-tenth the contact surface of the old type valve. And the scraping edge keeps the contact surface clean so corrosion can't stick the valve.

2 The curved inlet plate makes the water *curve* into the radiator, instead of bumping into the old square-cornered turn.

3 The handle is of a new design—non-breakable and non-heat-conducting. It is handsome in appearance with a permanent, black, hard-rubber finish.

4 An indicator attached to the handle travels between two stops, showing at a glance whether the valve is on, off, or in an intermediate position.

This new valve, with all its distinctive advantages, *costs not one cent more* than the old-type valves you have been using. Your jobber can supply you with a "Genuine Detroit" radiator valve for every heating need.

Genuine Detroit Hot-Water Radiator Valves

The only hot-water valve with the curved inlet plate, which insures a smooth uninterrupted flow of water and reduces friction.

DETROIT LUBRICATOR COMPANY

DETROIT, U. S. A.

"GENUINE 101 DETROIT"

Hot Water Radiator Valves

WORLD'S MOST COMPLETE HEATING SPECIALTIES LINE

B & B All Metal Thermostat

The B & B Line

Have Absolute Control of the Heat

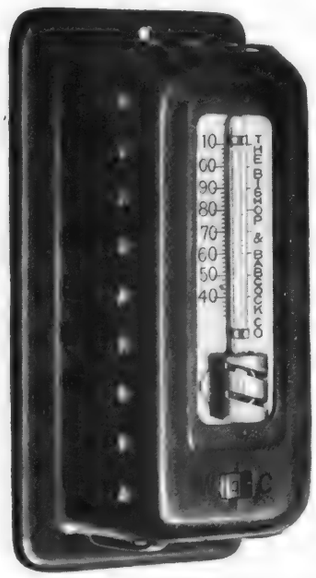
THE BISHOP & BABCOCK ALL METAL THERMOSTAT illustrated is the last word in simplicity. Note its complete mechanism, consisting of one moving part, which is the double seated air valve operated directly by the thermal member.

This air valve is a large port valve, with the operating stem, which moves up and down through the port, so that it cannot clog with dust or other foreign matter.

The thermal member is mounted on the frame, so that its operation is not affected by the expansion and contraction of the frame itself, due to cold walls.

THE BISHOP & BABCOCK ALL METAL THERMOSTAT will control the temperatures of the various rooms within less than one degree.

Literature sent upon request



B & B All Metal Stat Cover

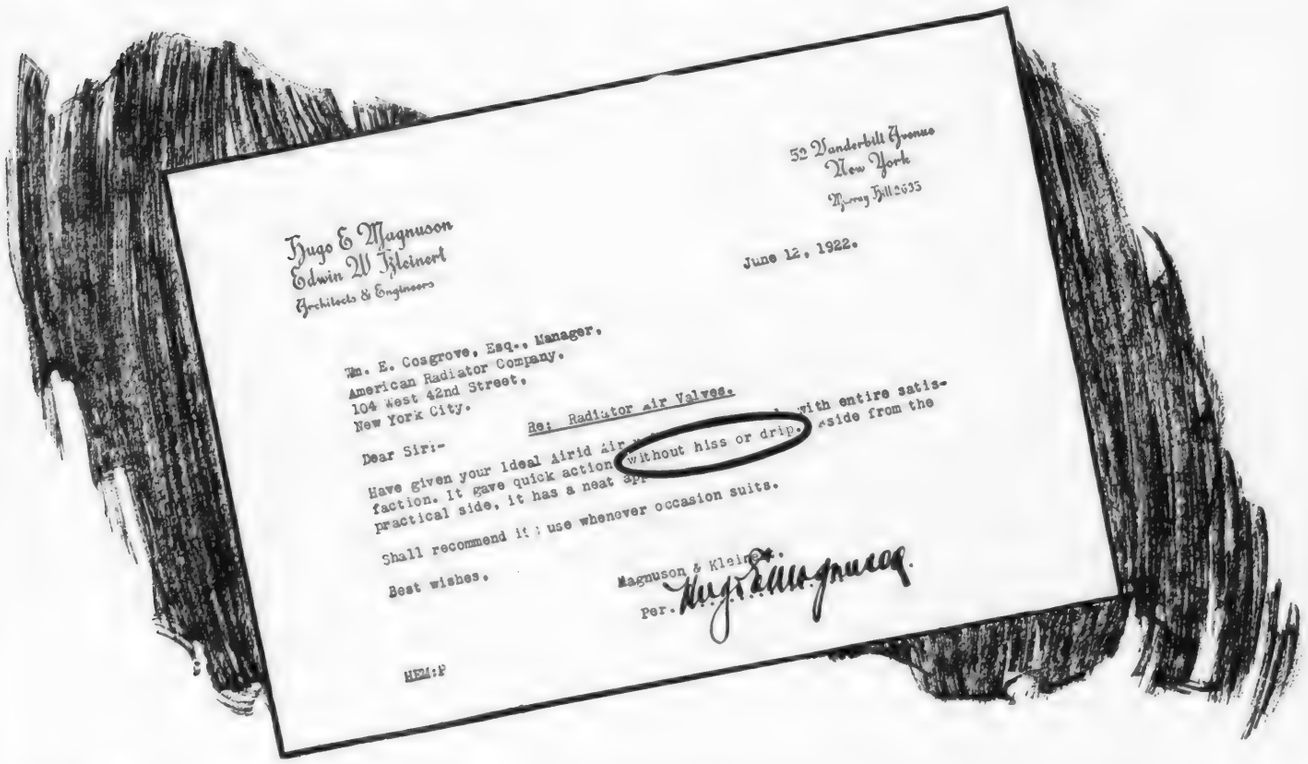
BRANCH OFFICES

Boston, New York, Philadelphia, Richmond, Atlanta, Birmingham, Nashville, Dallas, Indianapolis, Charlotte, Oklahoma City, Kansas City, St. Louis, Chicago, Buffalo, Detroit, Milwaukee, St. Paul, Denver, San Francisco, New Orleans, Pittsburgh, Cincinnati, Montreal, Canada.

THE BISHOP & BABCOCK COMPANY

General Offices and Factories, CLEVELAND, OHIO

"without hiss or drip"—



A jobber says—

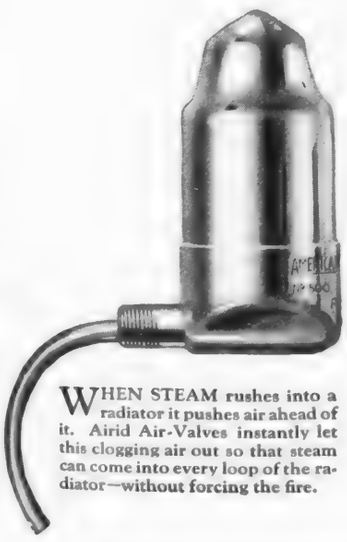
"The fitters claim that Airids are superior to any valve which they have used, and their repeat orders prove that they must mean what they say."

A Heating Contractor says—

"We have used Airid Air-Valves on every steam job we have installed since the valve was marketed. We are pleased to say that the Airid has made any number of satisfied customers for us."

A building owner says—

"Last winter, after installing Airid Air-Valves on the radiators in our office, we were able to heat the office very comfortably, eliminating the gas heater entirely, and showing a great saving of coal."



WHEN STEAM rushes into a radiator it pushes air ahead of it. Airid Air-Valves instantly let this clogging air out so that steam can come into every loop of the radiator—without forcing the fire.

MADE AND GUARANTEED BY

AMERICAN RADIATOR COMPANY

IDEAL Boilers and AMERICAN Radiators for every heating need

1807 Elmwood Avenue Dept. S 106 Buffalo, N. Y.

AIRID Air Valve

Rids the radiator of cold air

Barnes & Jones

Modulation, Vapor and Vacuum Heating Systems

Save Coal

They insure that all the steam generated in the boiler is condensed in the radiators and nowhere else.

And additionally with the BARNES & JONES MODULATION VALVE you use only as much steam as is necessary to take care of outside weather conditions—a big saving in mild weather—90% of the heating season.

BARNES & JONES

5 Melrose Street, Boston, Mass.

NEW YORK OFFICE
Grand Central Terminal

REPRESENTATIVES
Principal Cities

In Office Buildings—

as in every other type of building, Webster Systems of Steam Heating are pre-eminent

There are so many different possibilities of office building heating requirements, depending upon size, height, location, exposure, source of steam supply, etc., that the extensive experience of the Webster Engineers, based on the results of over 17,000 installations, is particularly helpful to architects and engineers in designing suitable heating plants.

And for buildings of any other type as well, the Webster organization is prepared to cooperate in assuring a heating system installation that will provide permanent satisfaction to owner, operator and occupant.

May we help you design your next heating installation?

Write for Bulletins

Warren Webster & Company
Camden, N. J.

Branches in 35 Cities

Cunard Bldg., N.Y.
Webster Equipped

Canada: Darling Bros. Ltd., Montreal

MODULATION SYSTEM OF STEAM HEATING
VACUUM SYSTEM OF STEAM HEATING
STEAM AND OIL SEPARATORS
FEED WATER HEATERS
STEAM SPECIALTIES

HEAT INSURANCE

Keeps the Heating System Working

STEAM heating systems require a positive outlet for air, to give full heat and efficiency. The Dole Shure-Vent Air Valve provides this positive outlet—it won't jam under any conditions. Even if water-logged, a touch on the push-button restores the automatic action at once.

Once installed, no more attention is necessary. The Dole Shure-Vent Air Valve works ***all the time.*** To get the most efficiency out of any heating system, Dole Shure-Vent Air Valves are a positive necessity. They are thoroughly tested and adjusted before leaving the factory and are ***guaranteed for the life of the heating system.***

Send today for free booklet "Upstairs and Downstairs" describing the twelve points of superiority of the Dole Shure-Vent Air Valve.

THE DOLE PACKLESS MODULATING RADIATOR VALVE

The Dole knob handle modulating valve is the latest development of the packless valve—full information free on request.

DOLE VALVE COMPANY

1931 Carroll Avenue

CHICAGO

You Can Safely put Your O.K. on the

RADIATOR TRAP SARCO

You can write "Radiator Trap Sarco" into your specifications with the feeling of absolute confidence that it will give satisfactory results in service and reflect credit on your selection.

The positive action of the Sarco keeps radiators thoroughly drained, preventing water-hammer and air binding. No other radiator trap is so sensitive to temperature changes—so quick to get rid of condensation. It increases the heating value of every pound of coal—a point that owners are quick to appreciate.

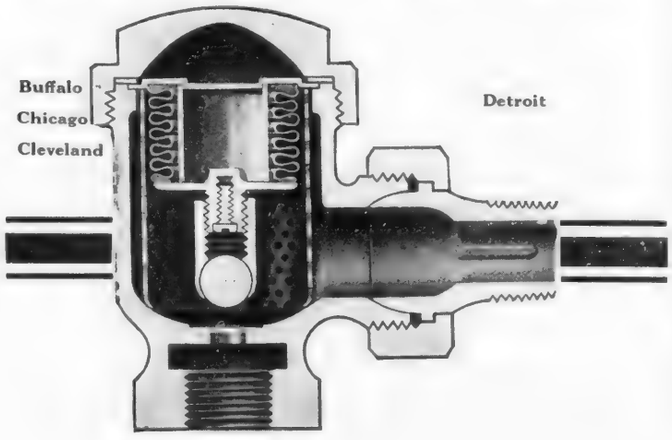
The *spiral* wear-resisting diaphragm, the freely-revolving Ball Valve head of extra hard bronze-alloy, and the unusually large strainer which protects both the Ball and Valve Seat from the grinding action of foreign particles, give long life to the Radiator Trap Sarco.

Add to these features the fact that it is of exceptionally heavy construction, so cannot crack from expansion and contraction nor be strained when being connected up, and you will understand why the Sarco lasts the longest and requires no attention after installation.

Keep a copy of our Booklet P-106 in your files for ready reference. Write for it Today.

SARCO CO., INC.

231 Broadway **New York City**



At Last!

A SINGLE PIPE VAPOR SYSTEM

Simple to Install
Efficient in Operation
Low in Cost

Descriptive Matter sent on request

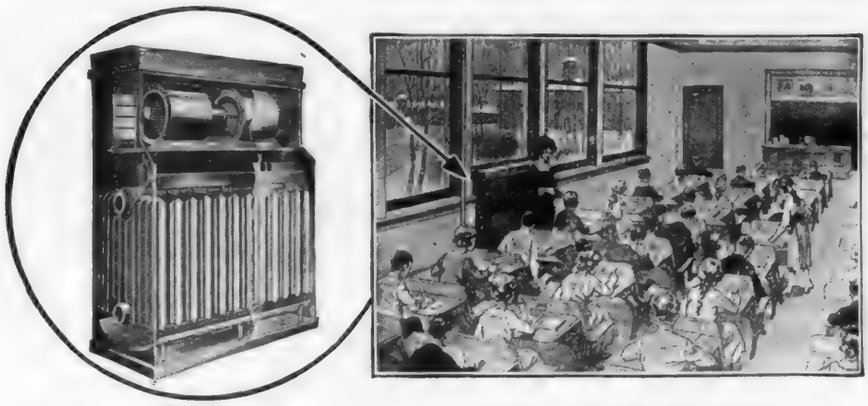
GORTON & LIDGERWOOD CO.

96 Liberty Street
NEW YORK

FISHER BUILDING, CHICAGO, ILL.

UNIVENT

"LIVE OUTDOORS-INDOORS"
(TRADE MARK)



Phantom view *Fresh heated air from the window*

Not only Better Ventilation, but Lower Building Costs

The Univent system is your ideal ventilating system. It is as simple and positive as opening wide the windows—but without the cold and dangerous draft.

The Univent draws air directly from outdoors, heats it and thoroughly diffuses it throughout the room.

The Univent heating and ventilating system does not use uncleanable ducts or flues. Thus, more sanitary ventilation is provided and building costs are lowered, and space is saved.

Each room is heated and ventilated as a unit by itself. Open windows or other conditions in other parts of the building do not affect its perfect operation.

Only the Univent in the room in use need be operated. It is not necessary to operate the whole ventilating system to ventilate two or three rooms. This means economy. It is the most flexible system known—insures fresh, pure air, perfectly diffused.

The Univent system is designed for schools and all buildings requiring mechanical ventilation. It may be installed in old or new buildings.

School board records show as high as 33⅓% increase in mental efficiency of pupils and 50% decrease in sick leave after good ventilating systems have replaced inferior ones.

The Univent system is the simplest system to install. It is more profitable for the contractor. No adjustment of dampers (which never stay adjusted) is necessary, yet distribution of air is always perfect. There is a lot of business in store for you in specifying and equipping the old schools in your vicinity with the Univent system.

***As a Heating and Ventilating Engineer**—You should know all about the Univent system. Send for a copy of our special 72-page Engineer's edition "Univent Ventilation." Please use your business letterhead.*

THE HERMAN NELSON CORPORATION, Dept. H1, *Moline,* Illinois

MOUAT VAPOR HEAT

Good Samaritan Hospital, Vincennes, Indiana

is equipped with The MOUAT VAPOR HEATING SYSTEM and consequently has POSITIVE HEAT CONTROL IN EACH ROOM without the use of vacuum pumps, traps or thermostatic valves.

Send for Circular

VAPOR MOUAT HEAT

THE MOUAT-SQUIRES CO.
CLEVELAND, O.

VAPOR MOUAT HEAT

ALLEN AIR-TURBINE VENTILATOR

Standard of Ventilating Efficiency

Wherever ventilation is desired—in factories, foundries, stores, schools, hotels, churches, theatres, residences, kitchens, bakeries, tanneries, barns, stables, garages, chimneys, air shafts, or wherever air circulation is required, Allen Air-Turbines *have proven the best, cheapest and most efficient* ventilating system known.

Many of America's largest architects, engineers and industrial concerns have adopted and endorse Allen Air-Turbine Ventilators.

Our air displacement is measurable and the figures given are guaranteed to be correct.

Diameter of Pipe	Air Displacement Cu. Ft. per Hour	
	Wind Velocity 4 Miles per Hour	Wind Velocity 8 Miles per Hour
8 Inches	17,300	21,600
10 "	26,500	32,500
12 "	38,600	46,200
15 "	54,000	69,000
18 "	85,200	102,100
20 "	105,100	125,600
24 "	149,000	185,000
30 "	225,000	272,000
36 "	281,000	330,000
42 "	324,000	414,000
48 "	360,000	473,000

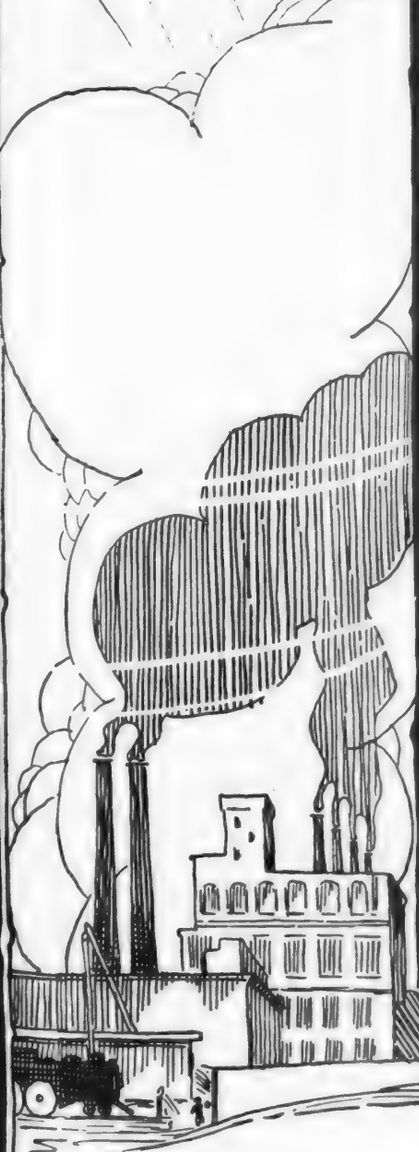
Patented

CARRIES OFF
GASES
MOISTURE
STEAM
SMOKE
VAPOR
FOUL AIR
ODORS
HEAT
FUMES
DUST
DAMPNESS

Write for Detailed Literature

ALLEN AIR-TURBINE VENTILATOR CO.
DETROIT Eighth and Porter Sts. **MICHIGAN**

Hot or Cold
Wet or Dry



Air Conditioning Yesterday and Today

It was not so many years ago that what was then known as "Air Conditioning" was looked upon as a ventilating problem to be solved by plumbers and heating contractors in a hit-or-miss manner.

But today, Consulting Engineers realize the value of an organization, the individual members of which have spent their lives in this highly specialized field of engineering.

Because of our record of 100% successful installations and thru the substantial service we have been able to render customers and friends, by the tests conducted in our Air Conditioning Laboratories we have established an enviable reputation.

Let us tell you thru a personal call from one of our engineers or by correspondence how we co-operate with the Consulting Engineer. Such a request in no way obligates you.

B. F. Sturtevant Company
Hyde-Park - - Boston
703

W. L. Fleisher & Co., Inc.
New York City
Design and Install All Sturtevant-Fleisher Air Conditioning Systems

Sturtevant
PUTS AIR TO WORK

SOME NEW PRINCIPLES IN VACUUM PUMP CONSTRUCTION

CONDENSATION VACUUM
Hydro PUMPS

Architects, Heating Engineers and Contractors,— if interested, send for Bulletin No. 100

AFTER twenty-five years of experimenting with other vacuum pumps and after many rigid tests of our own invention we now present—

Hydro High Vacuum Pump

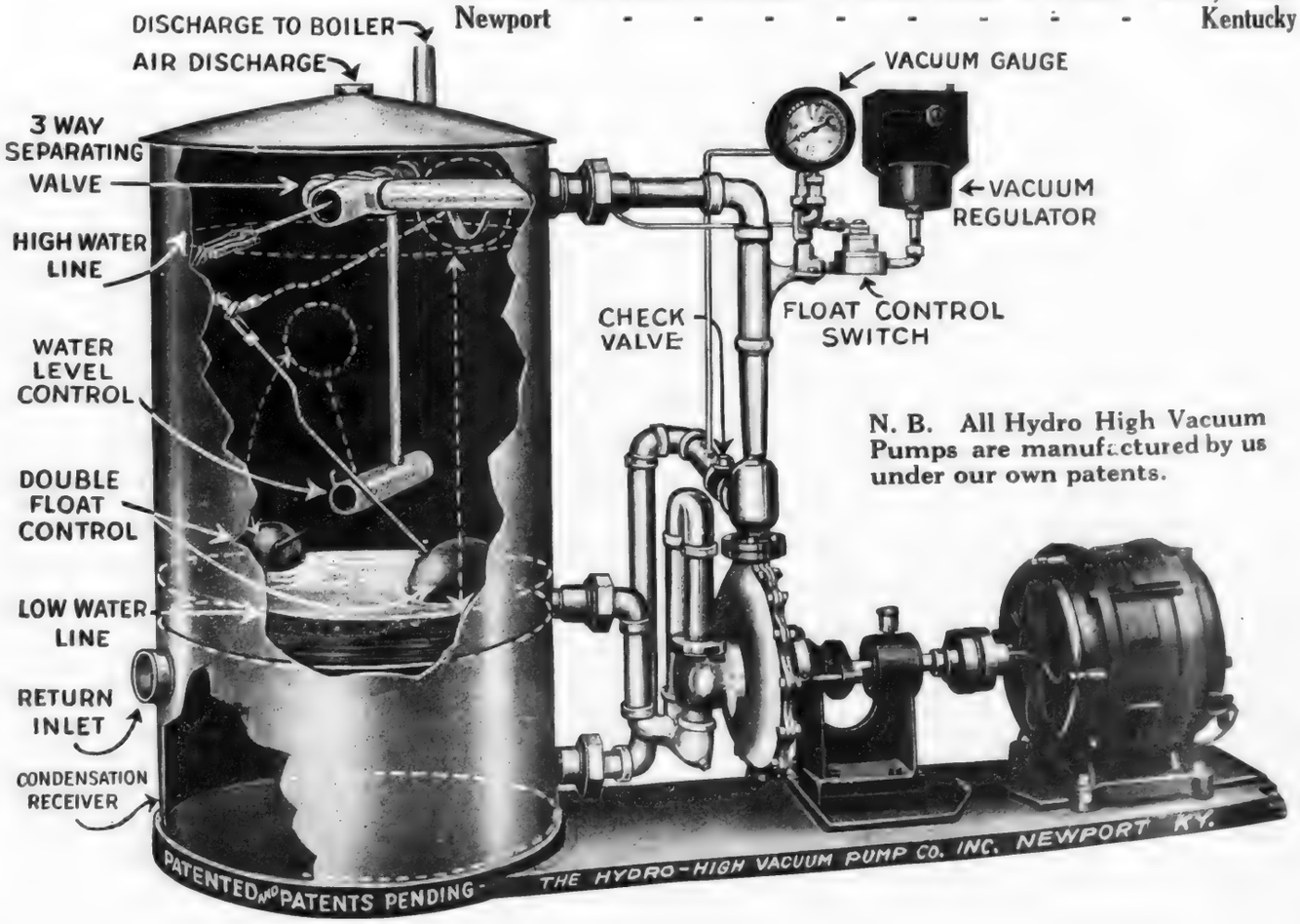
Without reservations, we guarantee the Hydro to obtain and maintain perfect vacuum at 85° F. It will obtain 15 inches of vacuum at 190° F.

Because of its unique construction, the Hydro operates on about *half the current* required by ordinary vacuum pumps.

Note how little floor space it occupies. All Hydro Pumps are assembled complete at factory, ready to install. We specify the right size to accommodate the radiation.

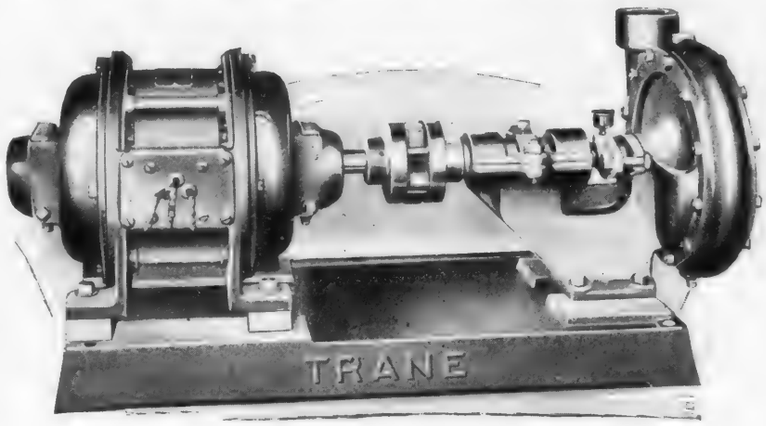
Our Engineering Department will gladly answer your questions.

THE HYDRO-HIGH VACUUM PUMP CO., Inc.
Newport - - - - - - - - - - Kentucky

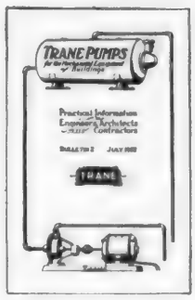


N. B. All Hydro High Vacuum Pumps are manufactured by us under our own patents.

If it's a Booster Pump you need---



Ready now—



10th Edition
24 p. 6 x 9 inches

Official Bulletin of Pump Division, Trane Engineering Department. Practical data and engineering information on condensation, circulating, and similar pumps. Free to engineers, architects, and heating contractors.

Where the pressure is 30 and you want it to be 60, use a Trane Booster Pump. All capacities and pressures up to 1,000 gallons per minute. Special sizes if you need them.

The Trane line of Booster, Circulating, Condensation, and similar pumps will adequately fill all pumping needs.

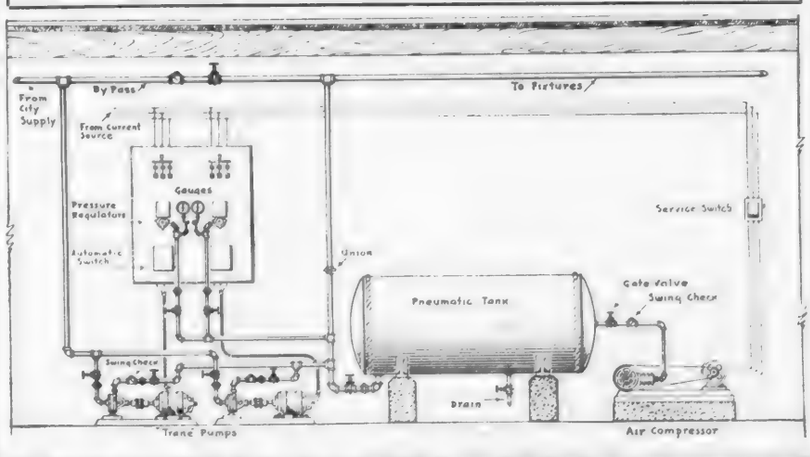
Your pump problems will be given attention by the same engineers whose broad experience has made possible the publication of our valuable Bulletin 2, "Trane Pumps."

The Trane Company

La Crosse, Wis.
206 Cameron Avenue

Chicago, New York, Boston, Phiadelphia, Buffalo, Detroit, Cleveland, Salt Lake City, Portland
Knoxville, Greensboro, N. C.

TRANE BOOSTER PUMPS USED WITH PNEUMATIC WATER SUPPLY

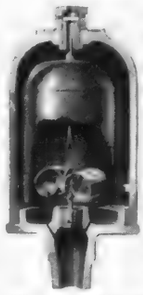


TRANE PUMPS

TRANE HEATING SPECIALTIES

Quick Vent and Float Vent Valves

with Vacuum Features



Two vents that meet every venting need. Use Float Vent (to left) where there is water; use Quick Vent (below) if the pipes are always dry.

They're large, these vents; full ¼-inch ports and ¾ inch pipe connections — real giants of the vent valve world. Float Vent measures 7¼ inches from tip to tip and weighs 4 pounds; Quick Vent measures 4¼ inches and weighs 2 pounds.

Both are equipped with easily accessible vacuum features, and the famous Trane Thermetal (all-metal) Element. Prices are surprisingly low.

"It's all in the element"

Write for Bulletin 12

TRANE SYSTEM VAPOR HEATING
"Heat at the turn of a valve"

ILLINOIS HEATING SYSTEMS
MAKE WARM FRIENDS

Use the time-proven ILLINOIS SYSTEM in your next job. Make your client a warm friend.

We manufacture a complete line of VAPOR, VACUUM, MODULATING HEATING SYSTEM SPECIALTIES. Correspondence invited.

CONWAY BLD'G—CHICAGO

ILLINOIS ENGINEERING COMPANY
INCORPORATED 1900
Representatives in 26 Cities 21st and Racine Ave., CHICAGO

Thos. Hoye, Htg. Cont.

McALEAR
Radiator Traps

are noted for their
Efficiency
Economy
Simplicity
Accessibility
Long-Life

and are
Non-Adjustable
Positive in Action
Noiseless in Operation

Milwaukee Athletic Club, Milwaukee, Wis.

Completely Equipped
McAlear Radiator Traps
McAlear Steam Specialties

Ask for Literature

No. 28 Trap

McALEAR MFG. CO.
CHICAGO

The Heating and Ventilating Magazine

VOL. XIX. NO. 9

CONTENTS FOR SEPTEMBER, 1922

Lowering Heating Costs with Fuel-Oil ..... *William T. Dean* 33
An Expert's Views on the Past, present and Future of this Fuel as a Substitute for Coal.

What the Present Coal Situation Means to the Heating Industry. ..... *F. B. Howell* 36
A Comparison of the Different Fuels Available for House Heating, with Special Reference to Coke.

Checking Steam Waste in Large Buildings. 38
Scheme Proposed and Successfully Carried Out by the Utilization Committee of the National District Heating Association.

New Data on Burning Kerosene Oil in House-Heating Boilers. *Joseph Harrington* 41
The Remarkable Results Obtained in a Typical Residence Installation Operated in Parallel with a Coal-Burning Boiler.

The Country in the Grip of a Coal Famine 46

Service Department 47
The Wheeler System of Ventilation.
Points on Fuel-Oil Heating.

Chats with Uncle Ben 48
Heating with Ceiling Radiators.

The Smokeless Boiler Situation in Cleveland and Cincinnatti 49

Correspondence 51
Meeting a Challenge in Water Heating Practice.

Ventilation Code Proposed as "American Standard" 52

Apprenticeship Problem Being Tackled on a National Scale 52

Summer Meeting of British Heating Engineers 53

Effect of Air Conditioning Advances in the Cotton Industry 53

Safe Chimney Construction 54

Good Health Week, October 23-30, 1922 55

National Trade Extension Bureau 56
Successful Methods for a Heat-Regulation Campaign.

Portable Unit Fan Blast Heaters 59
IV.—The Bayley Thermo Unit.
V.—"ABC" Portable Heating Units.

Standard Heating and Ventilating Data Sheets 68
No. 13-Q—Radiation Computing—Steam Heating, 24-in. Stone or Concrete Wall.
No. 13-R—Radiation Computing—Steam Heating, Single Windows.
No. 13-S.—Radiation Computing—Water Heating, 12-in. Brick Wall.
No. 13-T—Radiation Computing—Water Heating, 15-in. Brick Wall.

Advertisers' Index, Page 106

Engineers' Specification Index, Page 100

YEARLY SUBSCRIPTION $2.00 **SINGLE COPIES, 20 CENTS**

Published monthly at Cooperstown, N. Y., by the Heating and Ventilating Magazine Co.
Executive and Editorial Offices 1123 Broadway, New York

Entered as second-class matter at the Post-Office in Cooperstown, N. Y.
Copyright, 1922, by The Heating and Ventilating Magazine Co.

Send for list of references of school installations and complete data regarding the Spencer equipment.

Spencer Turbine

Cleaning Systems

Horizontal slow speed Spencer Turbine vacuum cleaning exhauster. Direct motor driven, wide clearance, multistage type equipment.

particularly developed for the cleaning of school buildings in a sanitary manner without spreading dust in the air, and giving the most thorough and rapid cleaning for school buildings.

Spencer systems are chosen by those who have had the most experience with vacuum cleaning apparatus in school buildings.

THE SPENCER TURBINE COMPANY
Hartford, Conn.

The cost of the
Johnson Pneumatic System
of Temperature Regulation equipment
is high. Out of necessity, however; not choice.
The perfection attained in The Johnson System, its refinements, its efficiency and the services rendered cannot be bought cheaply. This company strives only for utmost results. Naturally these cost money. And naturally these, finally, save money for the user. At that more serious end The Johnson System reduces in cost. There its price becomes reasonably low, more and more as its years of service pass.

The Heating and Ventilating Magazine

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

SEPTEMBER, 1922

LOWERING HEATING COSTS WITH FUEL OIL

An Expert's Views on the Past, Present and Future of this Fuel as a Substitute for Coal

BY WILLIAM T. DEAN,
President, The Combustion Company.

THE general law of compensation which has nurtured the human race for ages has come to our rescue again as our coal becomes scarcer and the labor entailed in its production and distribution so difficult to obtain and control. The Age of Liquid Fuel has arrived. Our navies and merchant marine have adopted oil fuel extensively. Our railway systems are rapidly changing to oil and our tremendous automotive development is wholly the result of the advent of the Age of Oil.

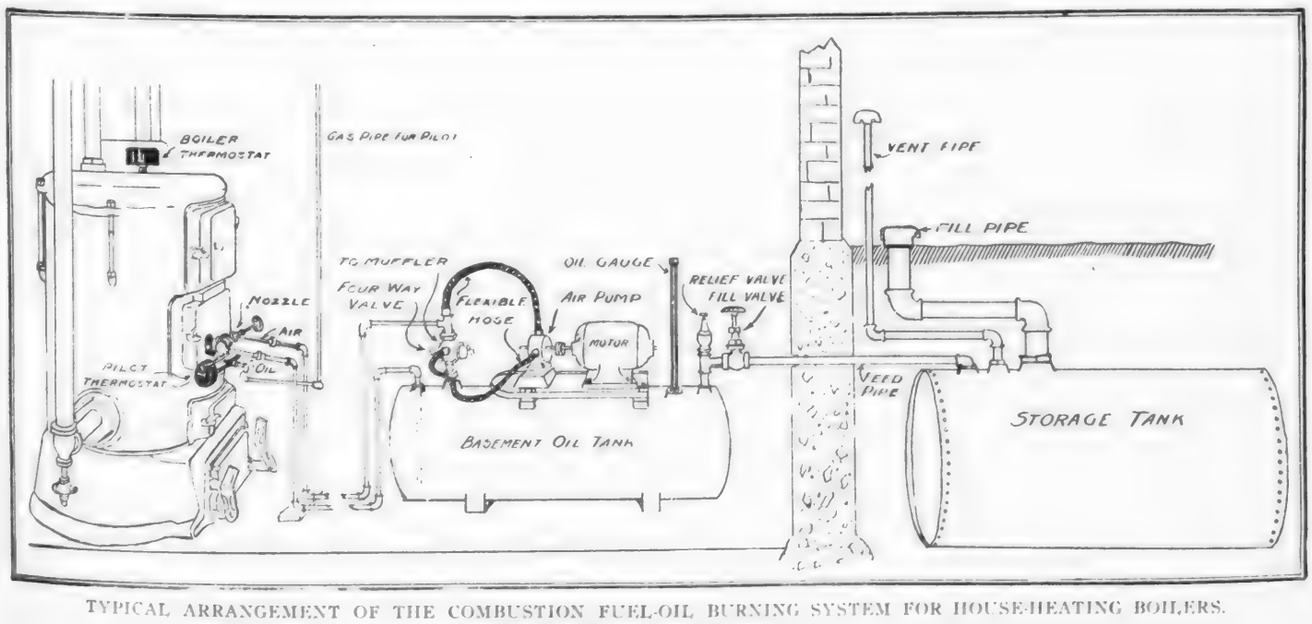
Oil was first used as an illuminant in the form of coal oil, later kerosene, and the by-products, gasoline, naphtha, lubricants, paraffin and fuel-oil, were thrown away. With the development of internal combustion engines, gasoline became valuable and the development at the same time of electric lighting so changed the market that gasoline became most valuable and kerosene was often thrown away. The growing use of gasoline engines (and machinery of every sort) created an enormous demand for lubricants, and refineries were established to recover these heavier products from the crude. Still there remained great quantities of kerosene and heavier distillates and fuel-oil.

Seemingly automatically to meet the changing conditions, the Diesel and similar heavy-oil engines were devoloped for stationary and marine work, largely utilizing the supply of kerosene and other distillates. The increasing density of urban population forced an enormous growth of the artificial gas industry and to meet this new demand *Gas Oil* was refined from crude to enrich the gases made from poorer grades of coal, the gas coals being no longer generally available on account of cost and transportation.

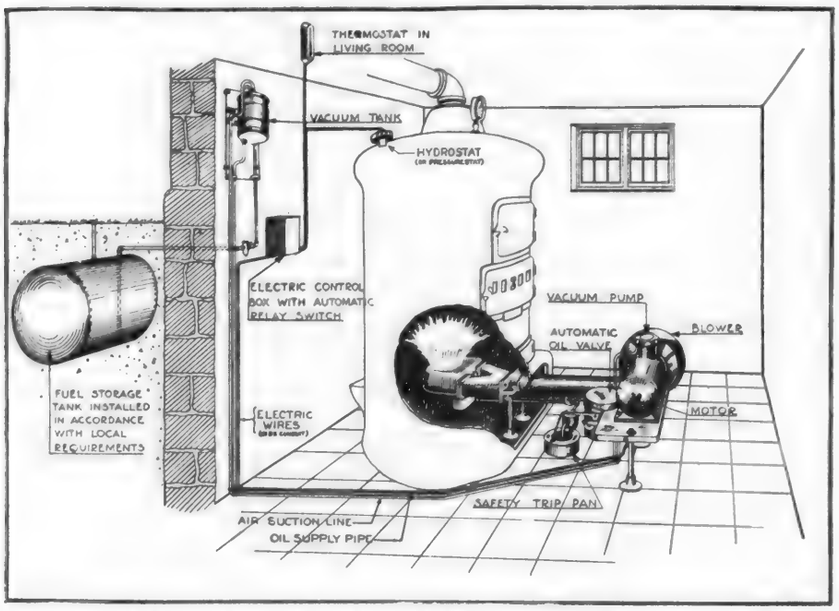
Thus, in a single generation, a great industry with countless ramifications has been built around the products of crude petroleum.

CAUSE OF THE ENORMOUS ACCUMULATION OF FUEL-OIL.

Until quite recent years, however, no general use was made of the residue from these many refinements of the crude, and



TYPICAL ARRANGEMENT OF THE COMBUSTION FUEL-OIL BURNING SYSTEM FOR HOUSE-HEATING BOILERS.
(The Combustion Co., Chicago, Ill.)



TYPICAL ARRANGEMENT OF "KEEN-HEAT" FUEL-OIL BURNING SYSTEM. (Winslow Boiler & Engineering Co., Galesburg, Ill.)

Fuel Oil was little known and seldom used except in highly-specialized industries. However, enormous the demand for gasoline, kerosene and the distillates, for every gallon of these refined products used, there is produced more than a gallon of the residue—fuel oil. The result is an enormous accumulation of fuel-oil which is increasing year by year, the disposition of which in many fields is a most serious problem.

Fuel-ol has been adopted by the navies and merchant marine of the world for economic reasons such as

1. Lower fuel cost.
2. 50% saving in bunker space.
3. 75% saving in re-fueling time.
4. 75% saving in fire-room labor.
5. Elimination of bunker fires at sea.
6. Elimination of all dirt from re-fueling, cinders and smoke.
7. Great rapidity with which additional boilers can be put into service.

All of these valuable features apply to land installation, excepting that in proximity to coal mines, plants well equipped with coal and ash handling machinery, find coal the cheaper fuel.

ADAPTABILITY OF FUEL-OIL FOR HEATING BUILDINGS.

The great future for fuel-oil lies in its use in heating homes and other buildings where for health and esthetic reasons it is desirable to eliminate the long train of evils incident to burning coal in isolated plants.

After adding to the producing cost, the heavy tolls of transportation, distribution and the profits of a chain of large and small jobbers and retailers, the cost of a ton of anthracite coal in the bins of a householder reaches (in Chicago) the almost prohibitive figure of $15.00 to $18.00.

But the householder's troubles do not end here. He must clean his heater several times each year (and his furnishings at least once) and proceed to shovel the costly mess into a hungry maw two to four times a day and then dig out a goodly percentage in the form of ashes and laboriously and expensively dispose of same. If he is fortunate enough to employ a janitor, houseman or chauffeur, he must pay directly or indirectly about $15.00 per month for eight months for the privilege. How different is the home with the automatic janitor!

A tank is buried in the yard, walled into or below the basement floor, with no loss of space whatever. A tank truck drives up, connects a flexible hose to the fill line and in ten minutes the supply is in without noise, dust, odor or stain of dirt. Oil was delivered at the writer's home one day last winter, during an afternoon party and no one even knew of the delivery.

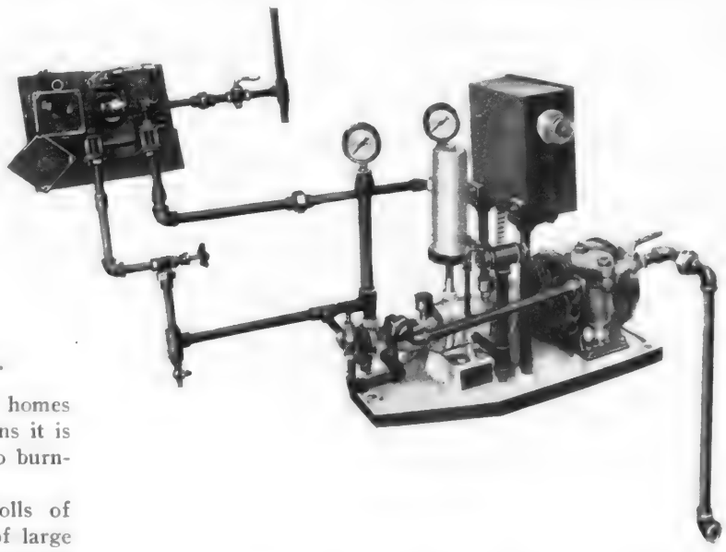
As the cool mornings and evenings of Fall approach, no one dreads starting the furnace frequently or worries over the loss of fuel by such practices, for it is only necessary to light the gas pilot flame and thereafter the thermostat will start and stop the fire, maintaining the house temperature at the desired point *and with no waste of fuel.* And does the tired business man, beset by thoughts of the price of wheat or the income tax, hurry into the basement mornings before shaving to feed a modern dragon and cart away its excreta? *He does not.* He sleeps a half hour longer and gets up to find his home warm, his wife good humored, and all the children happy and well.

All these things fuel oil has done for thousands the past winter, and through many winters for some, and the coming winter will see thousands of new devotees to the cult of cleanliness and comfort.

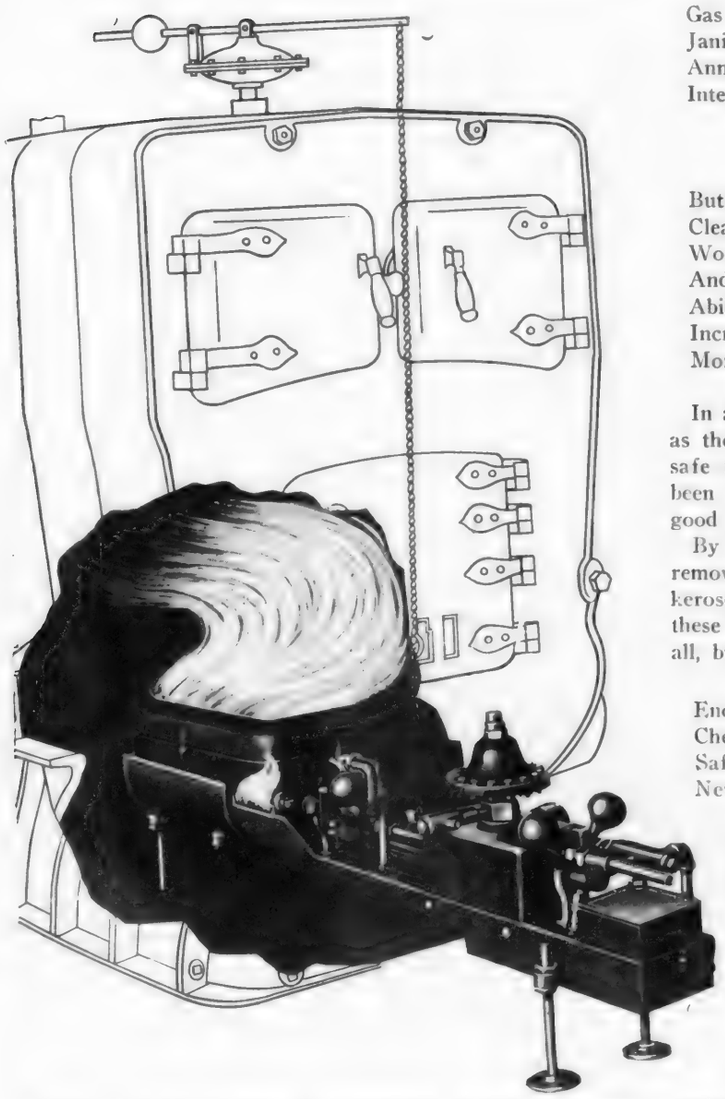
WHAT DOES IT COST?

Less than an automobile to buy, and without depreciation too, and in most cases less than coal to operate.

What is the oil equivalent of coal, I am frequently asked? For the same amount of heat delivered to the home, 100 gal. of fuel-oil is equal to a ton of good coal, but remember that with the automatic janitor there is a limitless reservoir of heat waiting to flow into the home, hence when a sudden cold snap comes, the gate opens and the house *remains* at the chosen temperature. With coal, however, unless extra attention is given, the house chills and fuel is saved at the expense of comfort (and colds). Because the automatic janitor stands ready to supply every demand, the actual equivalent to coal is from 110 to 125 gal. per ton.



VICTOR GAS-OIL BURNING EQUIPMENT READY FOR ATTACHMENT TO HOUSE-HEATING BOILER. (Victor Oil Burner Co., Chicago, Ill.)



TYPICAL INSTALLATION OF CALOROIL BURNER. (Caloroil Burner Corporation, New York.)

The average home owner might set up the case about as follows:

	COAL	OIL
15 tons coal @ $16.00	$240.00	
1800 gal. oil @ 6½c		$117.00
Gas and electricity		35.00
Janitor and ash removal 8 mos. @ $15.00	120.00	
Annual furnace cleaning	15.00	
Interest on investment		39.00
	$375.00	$191.00

But he should add:
Cleaning walls, rugs and curtains . . . . . ?
Worry over coal shortage . . . . . ?
And also credit the automatic janitor with:
Ability to live comfortably in a home instead of a flat.
Increased health and earning power for himself.
More time for himself, his family and his avocation.

In all this discussion I have reference to the use of fuel-oil as the only commonly available, ever economical and always safe fuel for isolated plant heating. All these benefits have been received by thousands and a multitude is awaiting the good news.

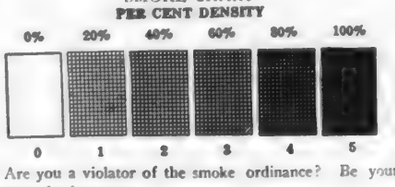
By fuel-oil I mean the residue, the by-product, after the removal of the expensive distillate, such as gas-oil, distillate, kerosene, etc. Many very good oil burners are confined to these lighter distillates, but the automatic janitor uses them all, but prefers commercial fuel-oil for these reasons:

Enormous reserves available.
Cheapest.
Safest (highest flash point)
Never congeals.
Never withdrawn from markket for other uses like gas-oil, which is normally used in gas and gasoline making.
Odorless.
Cannot deteriorate.
Spontaneous combustion impossible.
Ignition by spark or flame impossible.
Highest heat value per gallon.

The regulations of the National Fire Prevention Association and of many municipalities recognize these advantages of Fuel-oil and no longer list it as a more hazardous fuel than coal. All insurance companies readily attach riders to their policies permitting its use without increased rates.

Fuel-oil is the answer to the housing problem, for it gives the home owner all the comforts of the hotel or apartment, including automatic heat supply and automatic hot water supply and all at a cost within the reach of everyone.

SMOKE CHART
PER CENT DENSITY



Are you a violator of the smoke ordinance? Be your own smoke inspector.

Look at this card from a distance of ten feet and compare it with the smoke from your stack.

CARD DISTRIBUTED BY CINCINNATI SMOKE INSPECTION DEPARTMENT IN SMOKE-ABATEMENT CAMPAIGN.

WHAT THE PRESENT COAL SITUATION MEANS TO THE HEATING INDUSTRY

A Comparison of the Different Fuels Available for House Heating, With Special Reference to Coke

BY F. B. HOWELL,

Director, Department of Research, American Radiator Company.

HEAT—invisible, like electricity—is so contemptibly common that few, other than those immersed in its generation industrially, are aware of its all-pervading indispensability to human life and welfare until aroused by the grievous misfortune or calamity of having the main source of supply cut off—as is the case at the present time.

In the innumerable houses and buildings in this vast country a variety of fuels are used for generating heat for various domestic purposes. Hard coal, lignite, soft coal, coke, briquettes, natural gas, manufactured gas, fuel oil, kerosene oil and wood comprise the more important kinds. The use of hard and soft coal for domestic purpose largely exceeds all of the other kinds enumerated.

RELATIVE HEATING VALUE OF DIFFERENT FUELS.

An examination of Chart A containing curves and data showing the present cost in a large city and the relative heating value of the several fuels for one complete heating season of 5000 hours may be interesting.

As the heating of the home is probably the most important domestic utility for the several fuels—the data compiled on Chart A provides a graphic study relative to house-heating by steam radiation.

The fifth vertical column of figures specifies the quantity of heat in any of the fuels $1.00 will purchase. The fourth vertical column of figures indicates the percentage of heat—from the dollar's worth quantity—the steam heating boiler is capable of appropriating for useful house-heating purpose. Note that while these efficiency percentages are conservative, they probably represent a close average of what is actually developed during a winter's operation, due to unclean heating surface, inferior fuel and inattention.

RATIO OF FUEL USED TO CAPACITY OF HEATING SYSTEM.

The fuel required for a heating season is about one-third the quantity that would be used if all radiators were in constant and full use every hour day and night for the entire winter period. The sixth vertical column shows the cost of the several fuels to satisfactorily heat an average-sized living room continuously all winter.

Owing to the scarcity of hard coal and to the approaching cold weather, the public is concerned as to what constitutes the available fuel supply, its character, cost and the best method of utilizing it successfully.

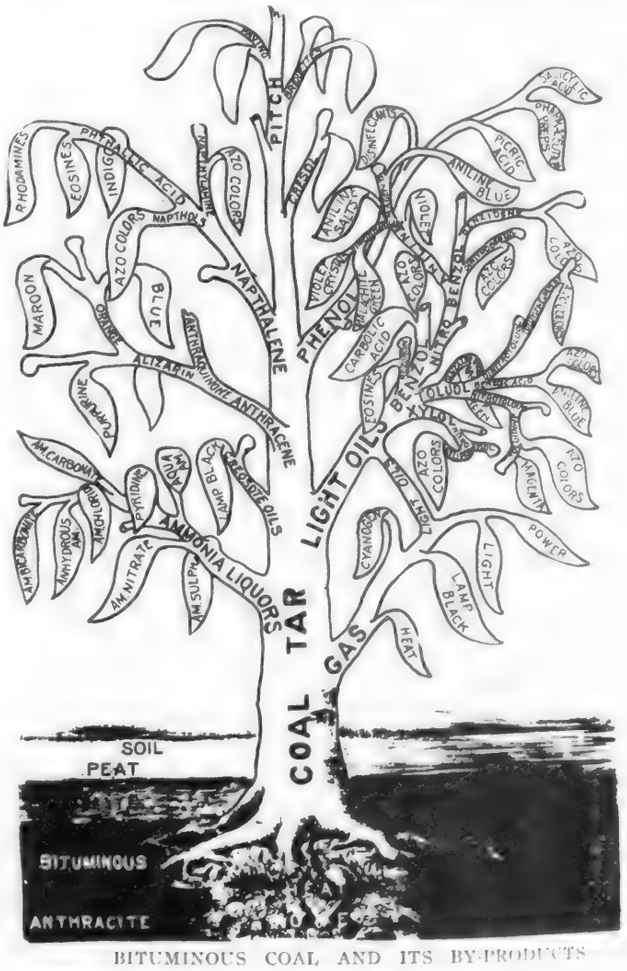
ADAPTABILITY OF BOILERS TO BURN VARIOUS FUELS.

All of the enumerated fuels have splendid heat value and can all be burned in a most complete manner in any heating boiler designed to burn solid fuels—although greater efficiency and satisfaction obtains when the boiler is designed for burning one particular kind of fuel.—Contingencies, however, like the present one, make welcome any fuel that is procurable.

SOFT COAL AND ITS BY-PRODUCTS.

Next to hard coal, soft coal is most extensively used for heating purpose. There are large sections of this country where it is the only fuel known and where it is used for all sorts of domestic purpose. Soft coal has an excellent heat value—generally exceeding hard coal in that characteristic. Its superior heat value is due to its volatile content which when liberated will pass from the heating boiler unconsumed, unless especially provided with heated air as it emerges from the burning fuel bed.

Contained in the volatile properties of soft coal are innumerable chemical constituents of great utility and value to mankind, which have been extracted and commercialized enormously by certain European countries for years, a practice which is now being similarly acomplished in this country. A few of the numberless substances extracted from soft coal are



BITUMINOUS COAL AND ITS BY-PRODUCTS

named on the leaves of the graphic picture of a tree shown herewith.

THE ADVANTAGES OF COKE FOR HOUSE HEATERS.

As is well known, coke is soft coal with all of its volatile matter extracted. Steam and water house heating boilers, domestic water heaters, and warm-air furnaces will burn coke just as well as they will burn hard coal.

As a matter of fact, coke is an ideal fuel for house heating purpose. It is a clean and convenient fuel, it eliminates smoke,

CURVES SHOWING COST OF VARIOUS FUELS AT DIFFERENT PRICES — PER SEASON OF 5000 HOURS. AVERAGE LOAD EQUAL TO ONE-THIRD CONTINUOUS FULL LOAD.

Kind of Fuel	Price Dollars	Calorific Value B.t.u.	Efficiency Of Boiler	B.t.u. $1.00 Will Buy	Cost to heat 50 Sq. Ft. Steam Radiator Per Season
Bituminous	6.50 Per Ton	13500 Per Lb.	50%	2.080.000	9.62
Coke	10.50 " "	11500 " "	70%	1.530.000	13.05
Anthracite	12.50 " "	12500 " "	65%	1.300.000	15.40
Fuel Oil.	.06 " Gal.	19500 " "	70%	1.660.000	12.05
Kerosene	.18 " "	20000 " "	73%	583.000	34.35
Natural Gas	.40 Per 1000 F³	1000 " CU. Ft.	80%	2.000.000	10.00
Mixed Gas	.65 " " "	900 " " "	80%	1.110.000	18.05
Manufactured Gas	1.20 " " "	600 " " "	80%	400.000	50.00

Automatic Or Hand Regulation on Oil or Gas Burning Installations Will Lessen Cost Of Operation.
Curves Based on Prevailing Prices at Buffalo. N.Y. August. 1st, 1922.

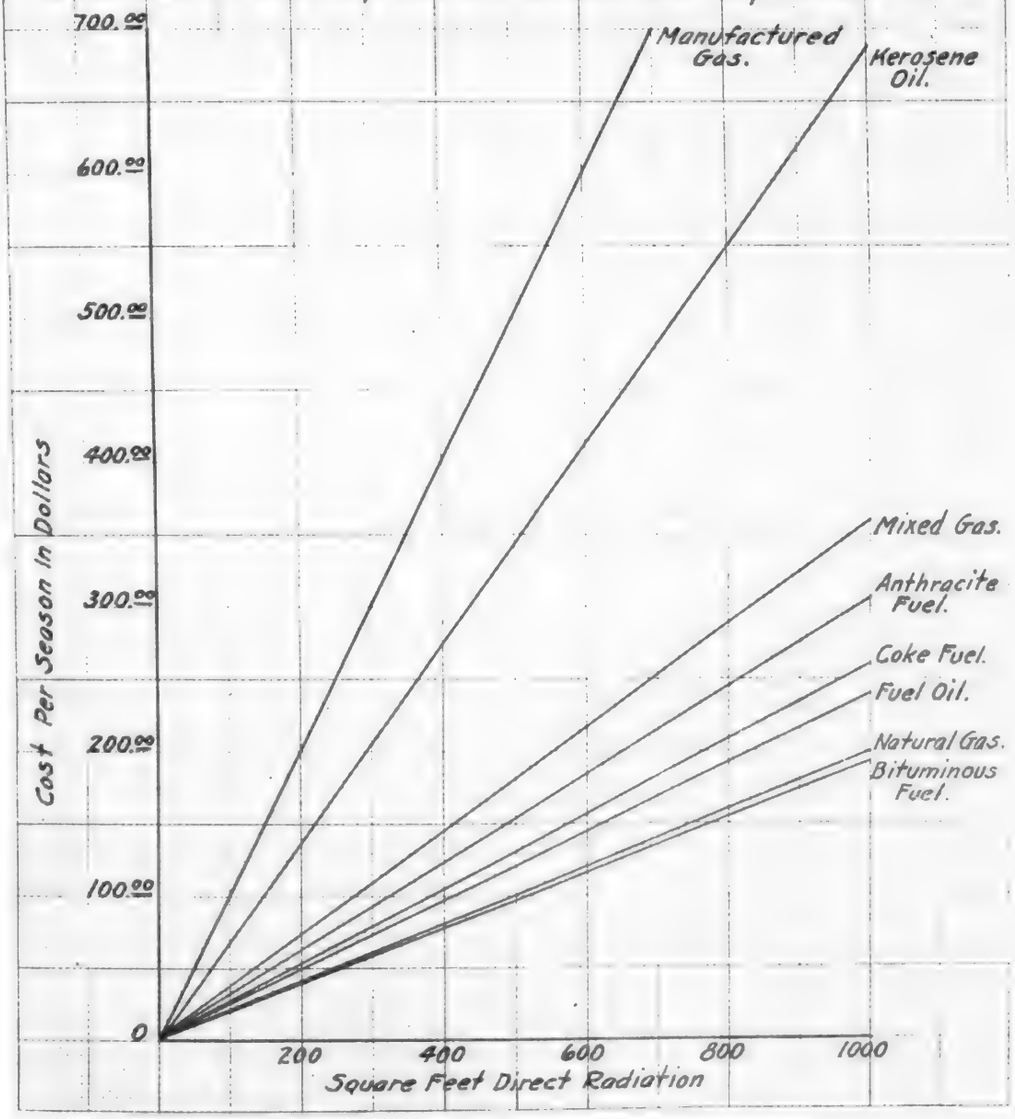
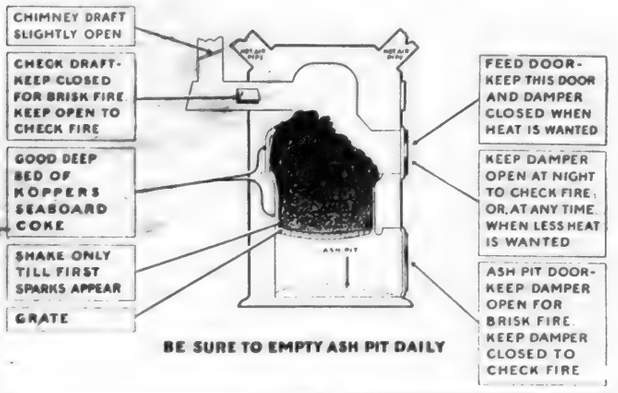


CHART A — RELATIVE COST OF DIFFERENT FUELS.

reduces the necessity of cleaning the boiler or furnace flues, requires no attention other than re-charging and provides a uniform temperature in the home. Coke should really become the sole fuel for domestic heating, as it largely is abroad. Its demand by the public would encourage the soft coal by-product plants to reclaim the innumerable and enormously valuable by-products that are wasted when soft coal is used for heating in the raw state—and equally important, it would put an end to the rapidly increasing and impossible smoke ordinances which are being enacted all over the country.


CHIMNEY DRAFT SLIGHTLY OPEN
CHECK DRAFT-KEEP CLOSED FOR BRISK FIRE. KEEP OPEN TO CHECK FIRE
GOOD DEEP BED OF KOPPERS SEABOARD COKE
SHAKE ONLY TILL FIRST SPARKS APPEAR
GRATE
FEED DOOR-KEEP THIS DOOR AND DAMPER CLOSED WHEN HEAT IS WANTED
KEEP DAMPER OPEN AT NIGHT TO CHECK FIRE; OR, AT ANY TIME WHEN LESS HEAT IS WANTED
ASH PIT DOOR-KEEP DAMPER OPEN FOR BRISK FIRE. KEEP DAMPER CLOSED TO CHECK FIRE
BE SURE TO EMPTY ASH PIT DAILY
FIVE RULES TO BE OBSERVED
1 Carry a deep bed of fuel; fire pot should be heaping full.
2. Use very little draft after the fire is started and keep it always under control
3. Do not shake the fire after first live sparks appear. Never poke the fire and clean only when necessary
4 Use sized coke: Nut (½ to 1 inch) for kitchen ranges and small parlor stoves. Stove (½ to 2 inches) for ordinary furnaces, heaters, and open grates. Egg (½ to 3 inches) for large furnaces with fire-pot over 3 feet in diameter
5 Never allow ashes to accumulate in the ash pit
THE WRONG WAY
THE WRONG WAY

SUGGESTIONS FOR BURNING COKE IN HOUSE HEATERS

The desirability of the use of coke generally for heating purpose in large or small installations cannot be over emphasized, for no matter how expertly soft coal is fired—or how scientifically designed or proportioned the secondary air provision has been made, the periodical firing period—and the periodical stoking period is essentially a smoking period—is what makes the performance during these periods unsatisfactory to the inspector and the manufacturer alike.

Coke has approximately the *same heating value* as hard coal of equal weight.

Coke takes up approximately twice the space occupied by hard coal of equal weight.

In other words, two bushels of coke and one bushel of hard coal have the SAME HEATING VALUE, but the two bushels of coke take up *twice as much space* as the one bushel of hard coal.

DIRECTIONS FOR BURNING COKE.

Because of this difference in bulk, coke when burned as a substitute for hard coal should be shoveled into the fire-pot until same is crammed full, and then the draft dampers should be closed practically tight, for coke does not require nearly as much air or draft as hard or soft coal.

Almost invariably there is a sufficient leakage of air into the ashpit of the heating boiler with all doors and dampers closed to maintain an entirely adequate coke fire—the slightest additional draft will often cause the coke fire to burn too fast, which makes clinkers, is extravagant and needless. So for these reasons fill the fire pot crammed full of coke. This helps to check the draft—and shut tight all doors and dampers.

Gas house or Solvay coke for heating purposes most frequently comes several sizes in a ton, ranging from furnace, egg, stove and chestnut, and sometimes finer than chestnut. If a load of this coke ranges in the larger sizes only, a beneficial way of checking or holding down the combustion or fire is, after firing a fresh charge of such sized coke to spread on top of same a shower of from two to five or six shovels full of ashes, depending on the size of the fire—this especially when fixing the fire for the night.

The ashes gravitate downward through the large spaces between the pieces of coke and effectively check the fire by choking somewhat the passageways of the draft of air through the coke. This will insure keeping the house warm well into the next morning or until the next firing period.

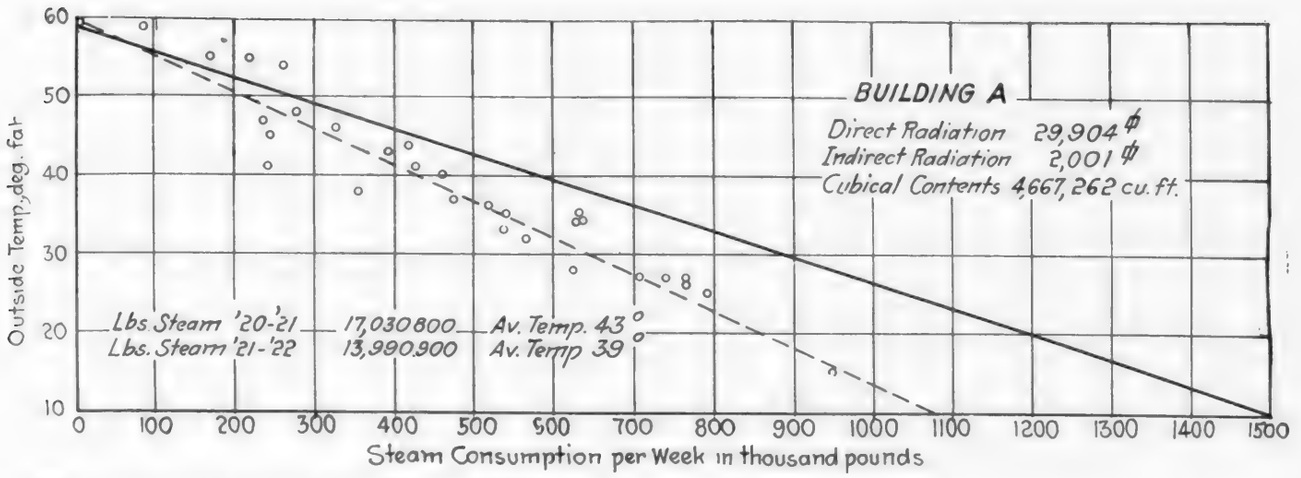
CHECKING STEAM WASTE IN LARGE BUILDINGS

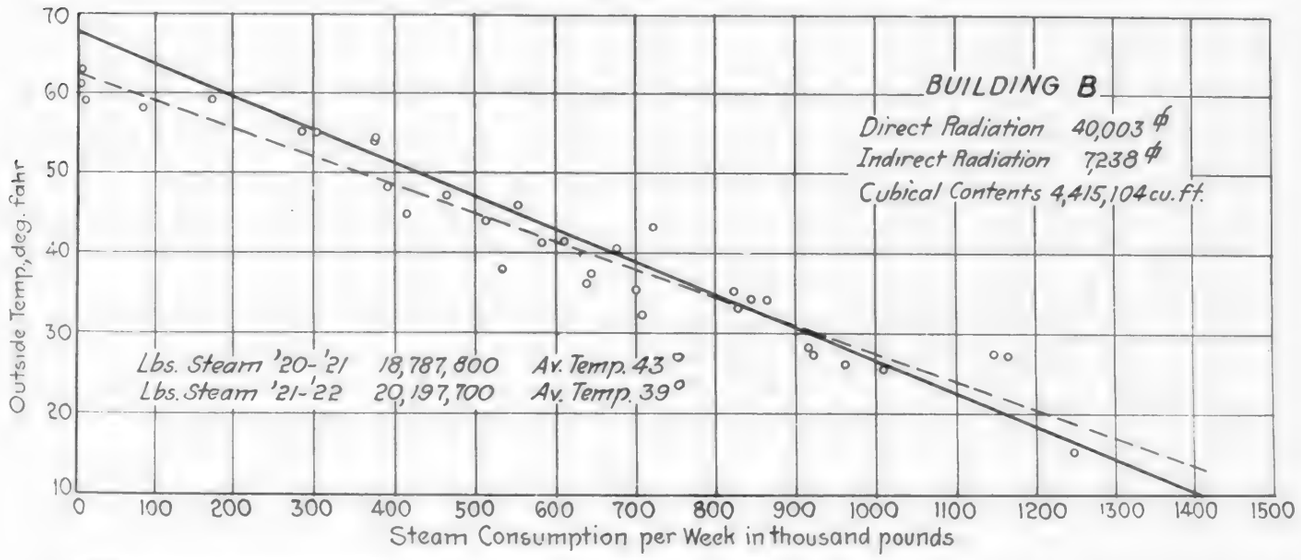
Scheme Proposed and Successfully Carried Out by the Utilization Committee of the National District Heating Association

EDITOR'S NOTE—*It is notorious that the amount of heat wasted in the office buildings would go far towards warming the homes of the country. In* THE HEATING AND VENTILATING MAGAZINE *for September,* 1921 *an account was given of the savings effected in the Guardian Building, in Cleveland, through the efforts of the management in seeing that the system was in good working order at the beginning of the season, in making daily comparisons of steam consumption and in caulking and weather-stripping all windows. In addition, each day, at 6 P. M. each of the* 1200 *windows was inspected to see that all were properly closed. In ordinary weather, the steam supply was shut off from the entire building at* 5 *P. M. Finally, a carefully-prepared letter was sent to each tenant asking his co-operation in the economical use of heat by the proper use of valves and in not needlessly opening windows with the radiators full on.*

IT IS common knowledge that heat is one of the easiest commodities to waste because it cannot be seen, observes the Utilization Committee of the National District Heating Association in a report which was presented at its recent convention at Cedar Point, O. Consequently all building owners and managers should watch the operation of their heating systems very closely and such supervision will unquestionably result in large savings.

The first question a building manager will ask, continues the report, is, "How much steam should I use?" To furnish the answer to this question the committee recommends the use of temperature-consumption charts, as shown in Fig. 1. The sample curves were made up from the weekly steam consumption for the season 1920-1921 and an average line drawn through the points. This line, then, represents the average consumption for the season 1920-1921 and no difficulty is experienced, states the report, in making this chart check within 2% of actual results.


BUILDING A
Direct Radiation 29,904 ϕ
Indirect Radiation 2,001 ϕ
Cubical Contents 4,667,262 cu. ft.
Lbs. Steam '20-'21 17,030,800 Av. Temp. 43°
Lbs. Steam '21-'22 13,990,900 Av. Temp 39°
Outside Temp., deg. fahr
Steam Consumption per Week in thousand pounds


BUILDING B
Direct Radiation 40,003 ϕ
Indirect Radiation 7,238 ϕ
Cubical Contents 4,415,104 cu. ft.
Lbs. Steam '20-'21 18,787,800 Av. Temp. 43°
Lbs. Steam '21-'22 20,197,700 Av. Temp. 39°
Outside Temp., deg. fahr
Steam Consumption per Week in thousand pounds

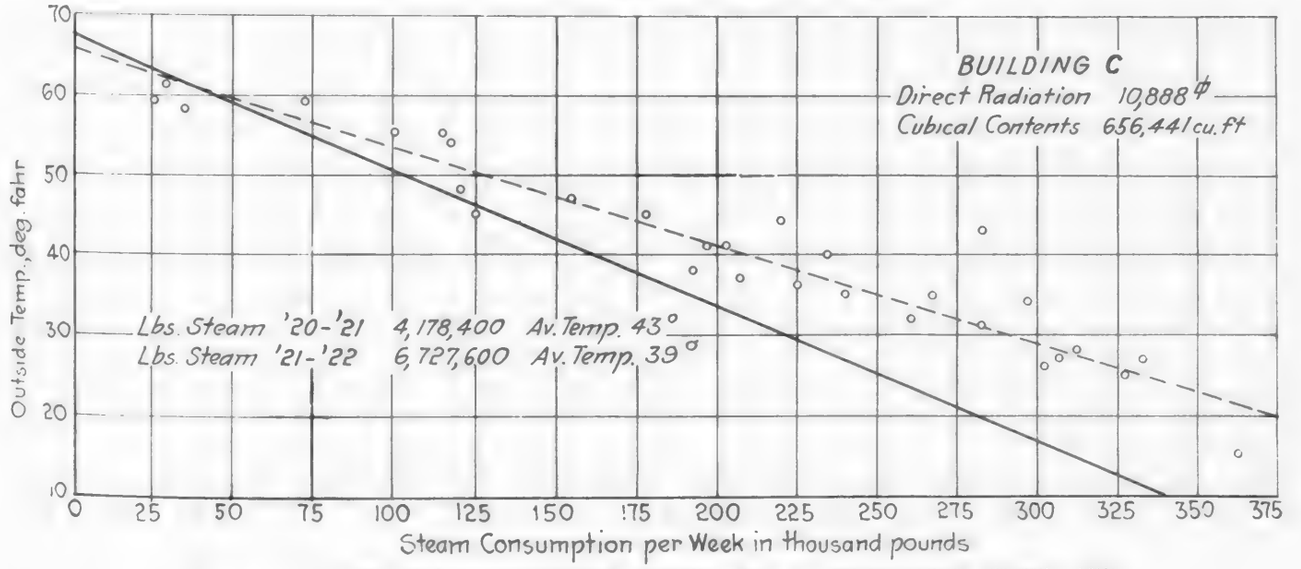

BUILDING C
Direct Radiation 10,888 ϕ
Cubical Contents 656,441 cu. ft
Lbs. Steam '20-'21 4,178,400 Av. Temp. 43°
Lbs. Steam '21-'22 6,727,600 Av. Temp. 39°
Outside Temp., deg. fahr
Steam Consumption per Week in thousand pounds

FIG. 1 — TEMPERATURE-CONSUMPTION CHARTS FOR A DEPARTMENT STORE AND OFFICE BUILDING COMPARED TO THE RECORDS FOR A CARELESSLY OPERATED BUILDING

BUILDING OWNERS FURNISHED WITH CHARTS SHOWING PREVIOUS YEARS' STEAM CONSUMPTION.

A blue print of the steam consumption chart is furnished the building owner and he is requested to plot his weekly consumptions for the next heating season on this print. The points in Fig. 1 represent these data and show at a glance the relative consumption as compared with the previous year.

Special attention is called to the fact that the data used in working up the curves were taken from the records of the companies supplying the steam and not worked up by the users. The temperatures used were taken from the government records published daily in the newspapers and consequently are available for all.

Chart A is for a department store and shows a 20% saving over the previous year. Chart B is for the Guardian Building in Cleveland and shows that the savings reported last year have been maintained. Chart C is for a building where the interest in the heating question seems to be at low ebb.

The chief argument advanced in the report for the use of these charts is that they eliminate from the discussion the question as to whether one season is colder than the previous one. Also they show at a glance whether or not there is any improvement.

With such a chart as a basis for comparison, a building manager soon becomes interested in ways and means of eliminating waste.

IMPORTANCE OF KEEPING SYSTEM IN GOOD CONDITION.

The next point of attack is for the operator to see that his system is in good condition. Valves that are to be operated should be tight so that when they are closed they will not leak. Vacuum pumps and radiator traps should be in such condition that a good vacuum can be easily maintained without the use of cold water.

"Radiator valves should work easier than the windows."

The importance of tight windows and especially tight window frames, the report states, cannot be over estimated. It is surprising how long a tight building will hold its heat even with the steam off.

EFFECT OF SHUTTING OFF STEAM AT NIGHT IN TWO BUILDINGS.

The next important point is to eliminate the overheating of buildings. Under this heading comes the question of shutting off steam during the night. The report then gives figures showing the effect of shutting off steam at night in two buildings (See THE HEATING AND VENTILATING MAGAZINE for May, 1922). A summary of the results obtained is as follows:

	BUILDING A.		BUILDING B.	
	Before Regulation	After Regulation	Before Regulation	After Regulation
Average outside temperature, Deg. F.	45	43	30	34
Consumption per 24 hrs., lbs.	166,660	88,264	49,730	23,000
Per cent. saving (equal temperatures)		47		48

Although these savings may be larger than the average, savings from 20% to 30%, states the report, can easily be found in the records of central station heating companies.

HOW LOW TO PERMIT THE TEMPERATURE TO DROP IN A BUILDING.

The question is often asked, "At what outside temperature is it economy to leave heat on in a building?" As this point varies with every different installation, the committee in its report takes the position that the proper answer would be: Never let the temperature inside your building get below 50° to 55°.

Another way of accomplishing the same results, it is pointed out, is by means of a thermostatic control on the house valve. This accomplishes automatically what the watchman does manually as outlined above. Clock attachments can easily be applied to this method of control so that the thermostat will automatically drop the temperature of the building at night and raise it again in the morning.

ADDITIONAL TESTS SHOWING EFFECT OF THERMOSTATIC CONTROL.

The results of two other tests are given herewith.

BUILDING A.

Without Regulator.	Outside Temp., Deg. F.	Condensation, Lbs.
December	20.7	209,000
January	22.1	218,000
With Regulator		
February	28.0	163,000
March	34.2	131,000
April	46.2	96,000

Correcting these two periods for equal temperatures shows a saving of 11.5% for the thermostatic control.

BUILDING B.

Without Regulator			
Oct. to Dec. inc. 1920	85 days	46.4° temp.	864,000 lbs.
With Regulator			
Oct. to Dec. inc. 1921	90 days	46.7° temp.	693,000 lbs.

Saving due to thermostatic control, 24%.

Another method of saving steam is by using the heat in the condensate to preheat the water entering the domestic water heater.

STEAM SAVED THROUGH USE OF "ECONOMY COILS."

The results of the installation of "economizers" in two office buildings is shown by the following:

STEAM FOR HEATING, HOT WATER.

BUILDING A.

Without Economizer	Days.	Consumption, Lbs.
December to April, inc. 1920-1921	140	2,324,000
With Economizer		
December to April, inc. 1921-1922	140	1,615,500

Value of steam saved at 70c per 1000 lbs. $495.95

Cost of installation, approximately $1000.00

In addition to this saving the hot water supply in this building was much more satisfactory as the water heaters were over loaded and part of the cost of the "economizer" can rightly be charged to additional heater capacity.

BUILDING B

Without Economizer	Days.	Consumption, Lbs.
December to May, 1920-1921	153	1,879,000
With Economizer		
December to May, 1921-1922	153	1,283,000

Value of steam saved at 70c per 1000 lbs. $417.20

Approximate cost of installation $1200.00

The Heat Utilization Committee, the substance of whose report is contained in the foregoing, was made up of C. H. Day, chairman; O. E. Kastens, M. A. Barbour and J. W. Meyer.

NEW DATA ON BURNING KEROSENE OIL IN HOUSE-HEATING BOILERS

The Remarkable Results Obtained in a Typical Residence Installation Operated in Parallel with a Coal-Burning Boiler

BY JOSEPH HARRINGTON.

EDITOR'S NOTE—*During the war, Mr. Harrington was in close touch with the activities of the Conservation Department of the United States Fuel Administration, being in charge of the Conservation Program in the industrial plants in Illinois.*

WHILE the Conservation Program of the United States Fuel Administration during the war represented an immense undertaking, it was relatively simpler than the one involved in the saving of fuel in domestic heating plants.

Being interested in the general subject, I undertook a series of experiments for the purpose of devloping data which would throw some light on the best methods of saving fuel in the domestic plant. I, therefore, converted my own home into an experimental station in so far as the heating plant was concerned, and equipped the boiler, which I was using, with a number of recording instruments designed to indicate the general conditions which obtained. A proper completion of this series of experiments was interrupted by the stoppage of the War and complete data were not obtained. However, several fundamental principles were evolved.

FUEL-OIL BOILER INSTALLED IN PARALLEL WITH COAL-BURNING BOILER.

An opportunity was taken advantage of in the installation of a NoKol burner in the existing plant. The very admirable indications then obtained induced the writer to re-open the matter last fall, which resulted in the installation of a modernized NoKol burner with the Breese Burn-Oil boiler. This boiler was installed late in the summer in parallel with the cast-iron sectional hot water boiler so that either one could be used at will. A separate flue in the chimney, however, was used so

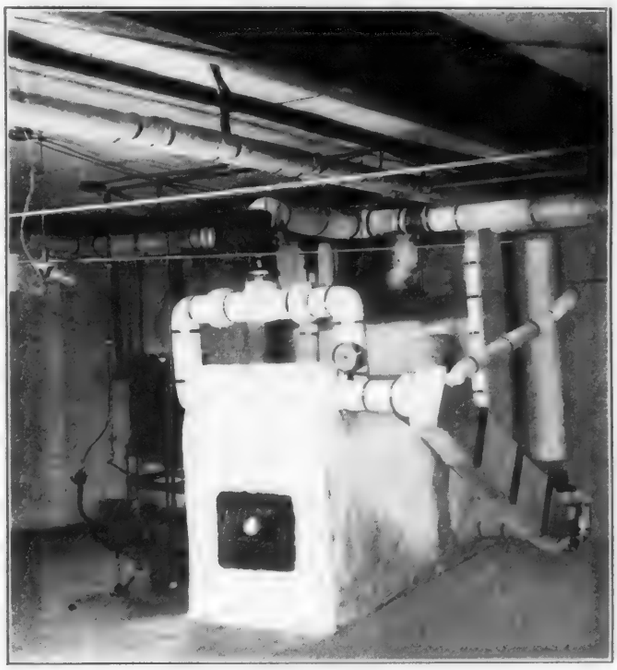
HOME OF AUTHOR IN WHICH TESTS WERE CONDUCTED.

that individual draft control was obtainable. The two water systems were connected and stop valves provided, but it was later found that the circulation proceeded—in whichever boiler was under fire—without interference from the cold unit. It, therefore, became very easy to switch over from one to the other without delay or difficulty.

A series of charts will be presented to which I will refer for convenience as Series A, B and C, and which I will now describe.

COAL-BURNING RESULTS SHOWN IN SERIES A CHARTS.

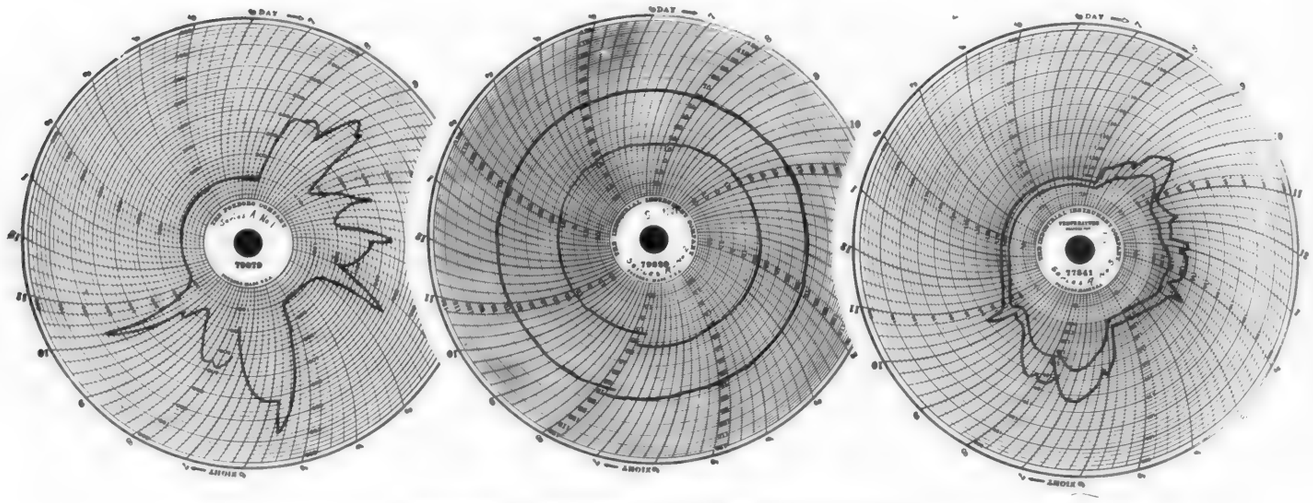
Series A was made with the standard sectional boiler, firing with coal in the ordinary way in the endeavor to get the usual operating conditions of such an installation. The fuel was Pocohontas coal of mine-run size, containing approximately 14,000 B. T. U. per pound and the boiler was kept brushed off and in good physical condition. A number of consistent charts were developed, the one shown being selected because of its typical character and because it illustrates the outstanding characteristics of this system.



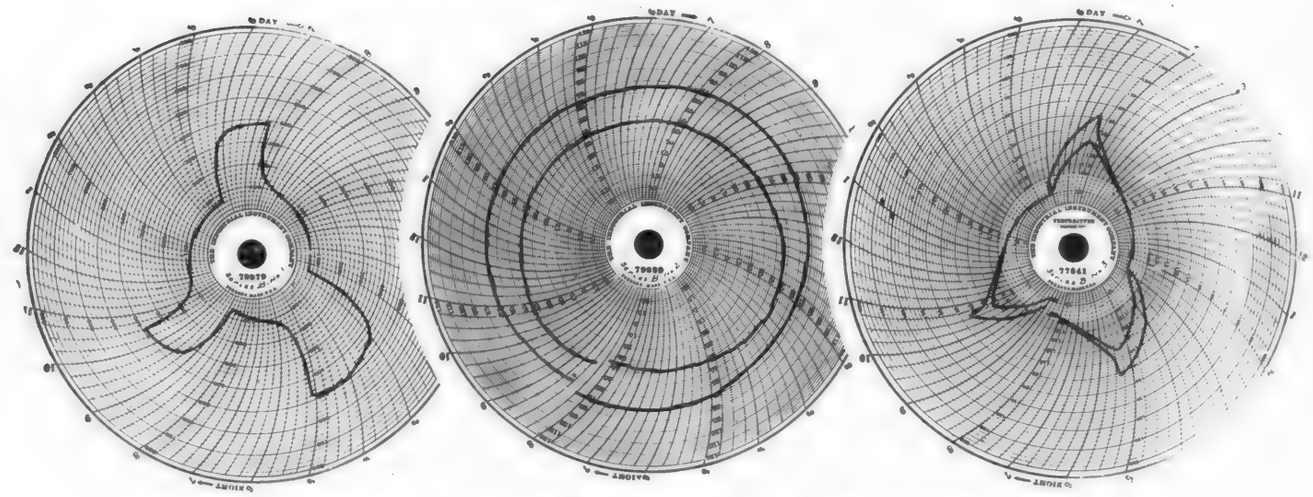
BREESE BURN-OIL BOILER, WITH NOKOL BURNERS USED IN TESTS.

Chart 1 indicates the exit gas temperature, the thermometer bulb being placed about 2 ft. from the top of the furnace. You will note the sudden rise in flue temperature following each firing period. The day was a fairly cold, windy day with a night temperature of about 14° F. above zero and the day temperature about 22° above zero. It was necessary to fire eight times during the period between 7:30 A. M. and 10 P. M. A maximum temperature of 660° was obtained with frequent approaches to the 500° mark; as a matter of fact, any opening of the damper or stimulation of the fire, shot the temperature up to about 400°. The heavy loss due to the heat going up the chimney need not be detailed, especially when it is known that not over 8% of CO_2 was obtained on the average.

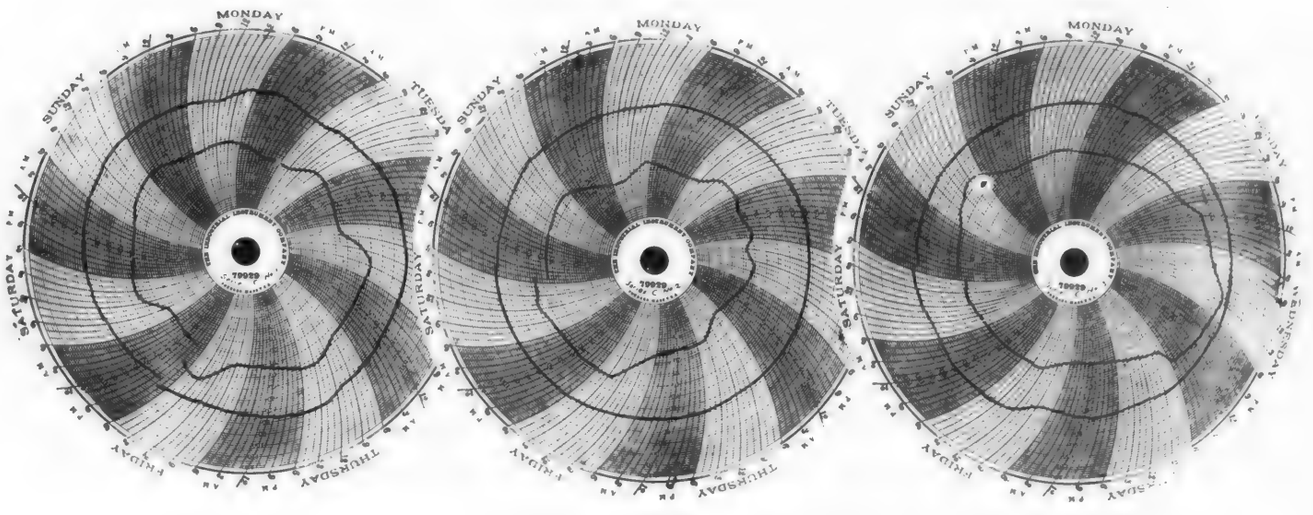
Chart 2 of this series shows with what difficulty the house temperature was brought up, it being about 58° in the house in the morning, and it required all day long to get the house



SERIES A, SHOWING COAL-BURNING RESULTS.



SERIES B, SHOWING OIL-BURNING RESULTS WITH BOILER DESIGNED FOR COAL.



SERIES C, SHOWING RESULTS WITH OIL-BURNING BOILER.

RESULTS OF EXPERIMENTS AS INDICATED BY CHARTS.

up to 70°. This item is to be carefully noted for comparison with later charts.

Chart 3 shows the water temperature in the flow and return pipes. The changes in this curve correspond very closely with the flue temperature changes consequent upon the various firing periods. It is interesting to note that the temperatures shown thereon were from 10° to 15° lower than the thermometer inserted in the upper section of the boiler. All of the recording instruments were very carefully calibrated and adjusted previous to being inserted in the system.

OIL-BURNING RESULTS IN COAL BOILER SHOWN IN SERIES B CHARTS.

After a series of records were made with coal, the grates were removed and a NoKol burner was installed. The weather was not quite as cold on the particular day in question (Series B) as was the case with series A, but the characteristics were sufficiently pronounced to indicate the quite different conditions. It should be emphasized that the boiler was exactly the same, the only difference in conditions being the average outside temperature.

Chart 1 shows the rise in flue temperature consequent upon starting the NoKol burner. This operated three times during the twenty-four hours, as is indicated by the rise in temperature and operated approximately 2 hours, 2½ hours and 2¼ hours, respectively. The maximum temperature during the longest period was less than 500° and during the shortest period was less than 400°.

Chart 2 shows that with the house at 64° in the morning, it only took 2 hours to reach a temperature of about 70°. This was with a NoKol operation of 2 hours. Again in the afternoon, when the longest operation occurred, the temperature rose from 64° to 70° in about 2 hours.

Chart 3 is most interesting, inasmuch as it shows the rise of water temperature in each case and shows how closely these temperatures followed the operation of the heater. One of the most noticeable things is the very sudden drop in flow temperature when the burner ceased operating and the correspondingly sudden rise at the beginning of operation. With a boiler designed to quickly and efficiently absorb the heat produced by the burner, this record would have been materially bettered and it was the analysis of this performance that showed how great was the necessity of a better heat absorber with this type of heat generator.

It might be timely to state at this point my strong belief in the basic efficiency of heat generation under the general conditions surrounding such an equipment as the NoKol burner. It is the same argument that holds good with such fuels as oil, natural gas and powdered coal—all virtually gaseous fuels—during the period of actual combustion. Under these conditions, combustion can be so adjusted to produce the maximum efficiency during the period when heat is required, and when it is not required, the flow of fuel can be absolutely stopped without consequential stand-by losses and the other losses attendant upon repeated fluctuation in combustion rates. The writer firmly believes in the principle of generating heat at the maximum practical temperature within an area as small as possible so as to obtain the best resulting temperature and make possible the utilization of the minimum amount of excess air and the most complete combustion of the fuel. It must be admitted that these conditions are pre-eminently characteristic of the burner used in these experiments.

RESULTS OBTAINED WITH OIL-BURNING BOILER (SERIES C CHARTS).

It was with this general idea in mind that the writer was sufficiently interested to install the special boiler designed by Messrs. Breese & Bettle for the purpose of most efficiently absorbing the heat of convection which characterizes the combustion of gaseous fuels. An installation was, therefore, made and has been in operation the past winter, from which experiments, the charts in Series C were obtained. This boiler has shown efficiency characteristics superior to any boiler I ever saw. The flue temperature never exceeds 190° F. and reaches this point only after the return water gets up to almost 130°. An average operating temperature of 180° is developed. Under test a stack loss of about 3% was shown.

These charts are of the seven-day type selected in order to give a record over a more extended period for a better analysis of the practical operating conditions. To establish comparative curves, *Chart* 1 was developed with anthraciite coal and the cast-iron sectional boiler used in the previous experiments. This was during the week, beginning February 4, 1922, and an attempt was made to carry the house temperature at 68°, which the writer prefers for reasons of both comfort and economy. But little comment is necessary, it being obvious that the house temperature varied from 60° to 80° with scarcely any period at the desired temperature for more than a few hours at a time. Anthracite coal is not nearly as responsive a fuel even as the Pocohontas, the ability to raise the house temperature being very difficult and it being usually mid-day or later before normal temperatures were reached. On the other hand, by crowding the furnace, it frequently occurred that a temperature much more than 70° was obtained as evidenced by the Saturday night and Sunday performance. There was a constant fight to keep the temperature fairly near right, even though the outside temperatures were not abnormal.

Contrast this with *Chart* 2, which shows an entire week of NoKol operation with the outside temperature as low as zero and averaging quite a bit lower than the week of anthracite operation. The fact is observed that the house temperature can and was raised 2° to normal in about one hour, the thermostatic control preventing the temperature from fluctuating more than 2° at any time. The slight sagging off in temperature on Sunday night and Monday, as well as Wednesday night and Thursday, is due to the fact that the recording thermometer was some 2 ft. lower than the thermostat and these days were particularly windy, causing an air penetrartion and a stratification within the house so that the temperature at the recorder was some 2° lower than at the thermostat.

The temperature at the thermostat was constant. The machine operated some 38 times during this week and it was indeed a pleasure to be able to get up in the morning and find the house right up to temperature with no work required on my own part and have the same comfortable conditions obtain throughout the day. To the casual observer, there was no temperature fluctuation, it being impossible for the normal person to notice 2° difference in temperature without referring to the thermometer.

FURTHER INVESTIGATIONS PLANNED IN CONNECTION WITH INTERMITTENT HEATING.

Later investigation will develop the relative efficiency between the constant temperature method and the method of allowing the temperature to drop during the night. It is the writer's belief from present observation that there is nothing saved in allowing a lower temperature at night. I am planning, also, to develop a curve which will indicate the fuel consumption per degree difference in temperature inside and out when the house temperature is varying between 60° and 75°. A very marked difference promises to develop under these conditions.

Chart 3 of this series was selected to illustrate two points, the fluctuation in house temperature when burning coal, as contrasted with the uniformity when using kerosene, and the automatic adjustment of the NoKol burner to temperature variations. In this case the coal was Pocohontas, with morning temperature around 60° and an interval of some two hours between each firing and the securing of the desired inside temperature. These conditions, showing on the same chart, make the contrast particularly noticeable. I call your attention, also, to the inside temperature on Tuesday and Wednesday. As the outside temperature increased, the intervals between the NoKol operations increased until on Wednesday, a particularly warm, sunny day, there was a full interval of 24 hours without the

burning of a drop of fuel. It would have required no less than 100 lbs of coal to have kept the furnace fire alive during this period and with a result that even with this little amount of heat the house temperature would undoubtedly have been raised to an unpleasant degree; doors and windows would have been opened with a consequent loss of all of this fuel.

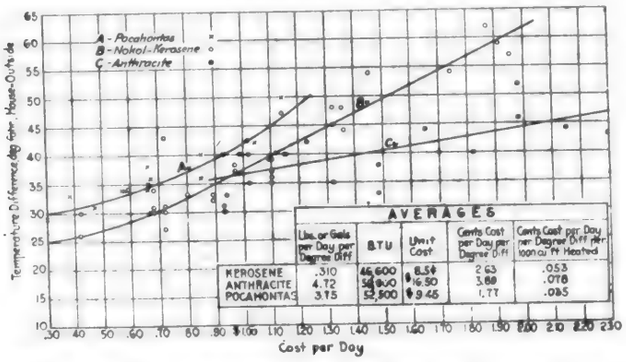
CURVES ON COST OF HEATING WITH DIFFERENT ARRANGEMENTS DESCRIBED.

To give point to all the foregoing and derive some practical data that could be applied to other cases, I have developed certain curves and averages that now follow. I wanted to develop a curve which would indicate the cost per day of heating my house with a given external temperature and I have, therefore, used the daily costs as abscissae and the temperature differences as ordinates:

Curve A—shows the results of Pocohontas coal and sectional boiler.

Curve B—shows the results of NoKol kerosene burner and Breese & Bettle boiler.

Curve C—shows anthracite coal in the same furnace used with the other solid fuel. Pocohontas coal cost me $9.45 per ton, anthracite coal cost me $16.50 per ton and the kerosene cost me 8½ cents per gallon. It is readily determinable, therefore, from the curves just what I could expect it would cost me per day with any given outside temperature with a constant inside temperature of 68°. It is undoubtedly correct, however, and seems quite fair to say that only rarely with either coal was the house truly at an average of 68°, which is most emphatically the case with the kerosene. It is, also, quite as true—and this is one of the points the writer desires to develop for a later report—that the amount of coal necessary to be burned to


A - Pocahontas
B - Nokol-Kerosene
C - Anthracite
Temperature Difference deg fahr. House-Outside
Cost per Day
AVERAGES
Lbs. or Gals per Day per Degree Diff
B.T.U
Unit Cost
Cents Cost per Day per Degree Diff
Cents Cost per Day per Degree Diff per 1000 cu ft Heated
KEROSENE .310 46,600 8.5¢ 2.63 .053
ANTHRACITE 4.72 14,000 $16.50 3.88 .078
POCAHONTAS 3.75 12,500 $9.45 1.77 .035

COST PER DAY OF HEATING HOUSE WITH DIFFERENT METHODS.

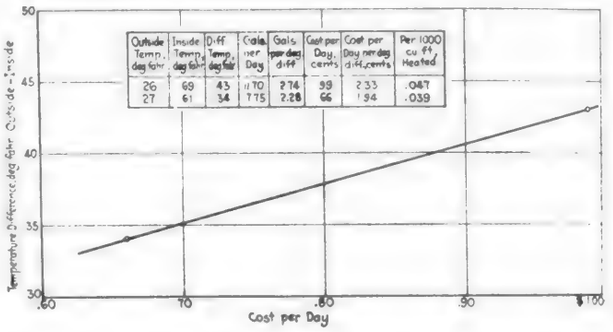
maintain a truly constant inside temperature of 68° will be appreciably more than that shown in this report and I desire to make this clear so that later modifications or correctoins of these curves may be properly made.

ANALYSIS OF RESULTS AS SHOWN ON HEATING COST CURVES.

Some of my deductions from these curves are as follows:

Curve A, with Pocohontas, shows a consistent result which undoubtedly would have shown if carried a little further, the same characteristics as Curve B. Curve C with anthracite, however, does not show up to as good advantage. It approaches horizontality, indicating a rather erratic result and the uncertainty of the fuel requirements under all conditions. You will note that with a 45° difference, it cost me one day $1.32 and another day about $2.16; in other words, I seem to burn greatly differing amounts of coal for approximately the same temperature conditions. This would seem to indicate that this coal must be burned under exactly the right conditions to get any kind of a result. It seems to be particularly true that low rates of combustion are very inefficient. When conditions happened to be such that I could get a snappy fire, I got along with very much less coal than otherwise. If it were not for the constant attention required, I could have increased my economy materially by cutting my grate surface in half and working the balance at about twice the rate; under these circumstances developing temperatures that would have been consistent with efficient operation.

Referring now to *Curve B*, you will note that I have carried this to a considerably greater temperature range and also that the points are quite consistent, which is what one would expect on account of the characteristics of this equipment. It compares


Outside Temp. deg fahr.
Inside Temp. deg fahr.
Diff Temp. deg fahr
Coals per Day
Gals per deg diff
Cost per Day, cents
Cost per Day per deg diff, cents
Per 1000 cu ft Heated
26 69 43 11.70 2.74 99 2.33 .047
27 61 34 7.75 2.28 66 1.94 .039
Temperature Difference deg fahr Outside-Inside
Cost per Day

COST PER DAY OF HEATING HOME PER DEGREE DIFFERENCE PER 1000 CU. FT. OF BUILDING HEATED.

very favorably with the Pocohontas curve in costs and it is my belief that some fundamental economies in operating methods can be developed which will still further improve this curve. As it is, it shows up most favorably with the best coal operation in actual cost, and in other ways it is beyond comparison. There is no objectionable noise, no odor, no dirt, the house is at a constant temperature which may be held within one degree of any given point and it functions in a perfectly automatic manner.

In order to make it so that results in my house can be compared with those in yours I have reduced it to cost per day, per degree difference, per 1000 cu. ft. of building heated. My house contains 50,000 cu. ft. of heated space. The burner is capable of consuming 2 gal. per hour.

It would seem entirely proper for me to express my satisfaction with this system of heating from the standpoint of the family who find the conditions most agreeable. In those intangible matters which cannot be reduced to figures, the equipment is certainly giving us the best of results. It is my hope and expectation that I can later on present some further interesting and important data on this matter.

SUPPLEMENTARY REPORT.

During the course of the experiments from which were developed the previous data, I noted the very considerable decrease in fuel required whenever the house was kept at a temperature lower than normal. It was possible only to get two points on the curve but these I obtained with considerable care and show them in the supplementary curve. The outstanding fact is that it cost just 50% more to maintain my house at 69° than it did at 61°.

I plan to secure further data in this matter the coming season.

THE COUNTRY IN THE GRIP OF A COAL FAMINE

IT IS certain now (September 1) that no settlement of the coal strike can prevent a serious shortage in the supply of both bituminous and anthracite coal to the great mass of users. While the amount of coal consumed for domestic heating is but a small percentage of the total produced (not over 10%), it is in the home, nevertheless, that the pinch will be felt the hardest, because it means, in many cases, that the householder must become accustomed to use a new kind of fuel, such as coke, fuel-oil or kerosene-oil. Throughout the East, also, wherever householders are obliged to use bituminous coal, it will be a brand new experience for most of them and one which may be expected to rasp their nerves until they have learned how to burn soft coal.

With the coal situation occupying the first pages of all the newspapers, readers of THE HEATING AND VENTILATING MAGAZINE are fully aware of the course of events in connection with the coal strike. For convenient reference, however, the text of the Interstate Commerce Commission's order granting priority to necessaries, and the personnel of the government's new Fuel Administration to administer these priorites, are given herewith:

U. S. COAL COMMISSION PROPOSED.

The third important step taken to date is the introduction in Congress of proposed legislation providing for the appointment of a coal commission "to make such a study of the coal industry as will enable it to assist Congress in the passage of legislation relative to regulation and control of the coal industry by the government." How important it is to take some such step may be judged from the statement of Secretary of Commerce Hoover that "the situation has now (August 18) reached a point where even if production is resumed, there must be more authority for the effective control of distribution and possibly of prices pending readjustment of the situation. . . Even assuming production is now resumed, the almost total exhaustion of stocks, the limitations upon transportation not only as a consequence of the strike but also with the usual fall peak in commodity movement, the necessity to accumulate large supplies at upper lake ports before transportation freezes, the necessity to make a forced drive of anthracite into the hands of householders, have all accumulated until it seems to me we must have something more than present authority to control distribution and stiffen the voluntary agencies engaged in the situation. Whether price control will be necessary, and how far necessary, can only be judged from day to day."

IMPORTANCE OF SEPARATE ACTION BY THE STATES.

The necessity for individual action by the various States in controlling the prices and distribution of coal is explained in the statement that the Federal authority in the matter outside of war does not extend beyond the control of coal moving in interstate commerce, or for the maintenance of interstate commerce. Therefore, any effective organization for control of price must depend upon the State authorities erecting such complementary machinery as will protect their citiizens on coal produced and consumed within their own boundaries, and against undue margins on the resale of coal, whether imported into the State or produced within it."

Priority Order Issued by Interstate Commerce Commission.

"In the opinion of the commission an emergency which requires immediate action exists upon the lines of railroads east of the Mississippi River *, and because of the inability of said carriers properly and completely to serve the public in the transportation of essential commodities it is ordered:

"I—That each such common carrier shall give preference and priority to the movement of the following commodities: Food for human consumption, feed for livestock, livestock, perishable products, coal, coke and fuel oil.

"II—That such carrier shall give preference and priority in the movement, exchange, interchange and return of empty cars intended for transportation of the commodities designated in paragraph one.

"III—That all common carriers, other than coal-loading carriers, are hereby authorized and directed to deliver daily to a connecting coal-loading carrier, or to an intermediate non-coal-loading coal carrier, for delivery through the usual channels to a coal-loading carrier, to make such delivery and of each such connecting coal-loading carrier to receive and use the coal cars so delivered for the preferential purposes.

"IV—That all carriers are directed to discontinue the use of cars suitable for loading and transportation of coal for the transportation of commodities other than coal so long as any coal mines remain to be served by it with such cars.

"V—That all common carriers are authorized and directed to place an embargo against the receipt of coal or other freight transported in open-top cars, suitable for coal loading, by any consignee, and against the placement of such open-top cars to any consignee who shall fail or refuse to unload such coal or other freight within twenty-four hours after such placement. This direction as to embargoes shall not interfere with the movement of coal to tidewater or the Great Lakes for transshipment to water, nor shall it apply where the failure of the consignee to unload is due directly to errors or disabilities of the railroads in delivering cars.

"6—That in the supply of cars to mines upon the line of any coal load carrier, such carrier is authorized and directed to place, furnish and assign such coal mines with cars suitable for the loading and transportation of coal in succession as may be required for the following classes of purposes, and in the following order of classes, namely

"Class 1—For such special purposes as may from time to time be designated by the commission or its agents.

ROADS TO BE SUPPLIED FIRST.

"Class 2—(a) For fuel for railroads and other common carriers, and for bunkering ships and vessels; (b) for public utilities which directly serve the general public under a franchise therefor, with street and interurban railway, electric power and light, gas, water and fuel works; ice plants which directly serve the public or supply refrigeration for human food stocks, hospitals; (c) for the United States, States, counties or municipal governments, and for their hospitals, schools and for their other public institutions—all to the end that such common carriers, public utilities, quasi-public utilities and governments may be kept supplied with coal for current use, but not for storage, exchange or sale.

"Class 3—As to each coal loading carrier which reaches mines in Pennsylvania, Ohio, West Virginia, Kentucky, Tennessee and Alabama. For bituminous coal consigned to any Lake Erie port for trans-shipment by water to ports upon Lake Superior, and subject thereto:

"Class 4—As to all such common carriers, commercial sizes of coal for domestic use and subject thereto:

"Class 5—Other purposes.

"No coal embraced in classes 1, 2, 3 or 4, shall be subject to reconsignment or diversion except for some purpose in the same class or a superior class in the order of priority herein prescribed.

"All rules, regulations and practices of such common carriers with respect to car service, as that term is defined in the act, are hereby suspended so far as they conflict with the directions hereby made.

"This order shall be effective from and after July 26, 1922, and shall remain in force until the further order of the Commission."

* This was later extended to the section west of the Mississippi.

New National Fuel Administration.

Henry B. Spencer, Fuel Distributor.

STATE FUEL AGENCIES.

Alabama—Roy R. Cox, Fuel Administrator, Montgomery.

Connecticut—Public Utilities Commission, Hartford.

Florida—Florida Railroad Commission, Tallahassee.

Illinois—Robert M. Medill, director Department of Mines, Springfield.

Indiana—Indiana Public Service Commission, Indianapolis.

Iowa—Charles Webster, Fuel Administrator, Des Moines.

Kansas—Court of Industrial Relations, Topeka.

Kentucky—J. Sherman Cooper, chairman Kentucky Railway Commission, Frankfort.

Massachusetts—Fuel Administrator, Boston.

Michigan — State Administrative Board, Lansing.

Nebraska—State Railway Commission, Lincoln.

New York—Committee composed of representatives of the Port Authority, the Public Service Commission, the Transit Commission and the Attorney General.

North Carolina—State Corporation Commission, Raleigh.

North Dakota Railroad Commission, Bismarck.

Pennsylvania—Public Service Commissioin, Harrisburg.

Rhode Island—George H. Webb, Fuel Administrator, Providence.

South Caroline—B. E. Gerr, chairman Governor's Coal Committee, Greenville.

Tennessee—State commission composed of W. N. Beasley, representative of Public Utilities Commission; Wilbur A. Nelson, state geologist; T. F. Peck, Agriculture Department, and O. P. Pile, Bureau of Mines and Mining.

Vermont—Hugh J. M. Jones, Montpelier.

Virginia—Mator Alexander Forward, Coal Administrator, Richmond.

West Virginia—J. Walter Barnes, Fuel Commissioner, Charleston.

Wisconsin—Edward Nordman, Commissioner of Markets, chairman; L. E. Gette, chairman of Railroad Commission; John G. Mack, State Chief Engineer, and J. B. Borden, secretary Board of Public Affairs.

The Heating and Ventilating Magazine

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

Member of the Associated Business Papers Inc.
Member Audit Bureau of Circulations.

Vol. 19 September, 1922 No. 9

Published Monthly at Cooperstown, New York, by the
HEATING AND VENTILATING MAGAZINE COMPANY
Executive and Editorial Offices
1123 BROADWAY, NEW YORK
A. S. ARMAGNAC . . . . . President and Editor
GUSTAVE PETERSEN, Secretary-Treasurer and Business Manager

European Representative
W. G. HOLLINGWORTH, Bessemer House, Adelphi, London, W. C.

Subscription	$2.00 per year
Canada	2.25 per year
Foreign Countries	2.50 per year
Back numbers	25 cents each

IT TAKES an emergency to jolt some people out of their accustomed ways. It would not be fair to say that this is the only motive that has caused progress in the heating industry, but it is a remarkable fact that many of the advances which, in the light of later events, have appeared quite obvious, have been the direct result of unanticipated conditions which had to be met. With the coal famine, for instance, staring us in the face, we know now that it has always been possible to adapt house-heating boilers for the burning of soft coal, coke, fuel-oil or kerosene-oil at a substantial saving over the cost of coal. But in our complacent way we sought the easiest course and catered to the old-time habits of the public, without making much of an effort to lead it towards more economical methods. To be sure, the smokeless boiler development has opened the way towards the use of soft coal and the smaller sizes of anthracite, and the promoters of these types deserve credit for their leadership, which was not obtained without a struggle, but in the minds of most people, especially in the eastern section of the country, the dominance of anthracite is indisputable.

In the face of the hard coal famine, the East is at last awakening to the fact that there are other fuels besides hard coal, or any other kind of coal, for that matter, and inquiries are pouring in for information on fuel-oil, kerosene-oil and gas-burning appliances. Fortunately those interested in these fields have been persistently at work developing their apparatus and it looks now as if their patience will be rewarded in a widespread adoption of their products.

TO THOSE who are preparing to plunge in on a large scale in the handling of fuel-oil burning apparatus, a word of caution is needed. It should be remembered, for instance, that in many sections knowledge of fuel-oil and its characteristics for household use is entirely lacking, and to this extent the heating industry has a responsibility towards the householder which does not exist to anything like the same extent in straight heating work. He has got to show the user, among other things, that burning oil is an intermittent process, while coal burning is a continuous process, and that carrying the heat product of either process is a matter of regulation. With oil, this control is effected through the motor; with coal, by the draft dampers. Therein, as has been well said, is the cardinal difference between the two systems.

Many people have balked in the past at the use of fuel-oil on account of a sense of danger due to the presence of the oil in their homes. Perhaps the best answer to this fear is the fact that the regulations of the National Fire Prevention Association and of many municipalities no longer list fuel-oil as a more hazardous fuel than coal. All insurance companies, we are informed, readily attach riders to their policies permitting its use without increased rates.

Finally, the prospective users must not be permitted to get the idea that a change from coal to fuel-oil means nothing more than a change of burners. It is true that, as a rule, coal-burning furnaces may readily be adapted to the burning of oil, but the contractor needs to inform himself fully on the changes to be made in the furnace itself, as well as on the other necessary equipment, such as the pumping units, burners, controls and oil-storage requirements. As a rule, the manufacturers themselves are the best sources of information on these points.

It remains to say a word concerning gas for house-heating purposes in the light of the present crisis. We have it on the authority of the American Gas Institute that the gas industry is looking forward to a winter like that of 1917-1918, in the worst period of the war. "We are making all preparations," it was stated, "for an unprecedented rush of business. We expect to see our doors besieged by people prepared to carry home gas heaters under their arms, if necessary." This, of course, represents an emergency situation, but even with the comparatively high cost of gas, some notable progress is being made in this field which is making gas heaters more of a competitor than ever before of coal heaters.

BETTER HEALTH WEEK will be observed throughout the United States during the week of October 23-30. This campaign is directed specifically to public health as provided by ventilation, sanitation and personal hygiene. It is the first movement on a national scale to popularize ventilation, and with the impetus which the campaign may be expected to acquire as it gathers headway, the ventilating industry will be given a rare chance, and one which it has long awaited, to get its story before the public.

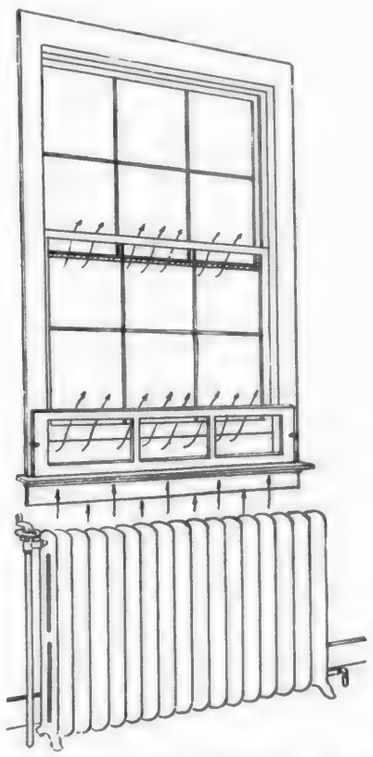
SERVICE DEPARTMENT

The Wheeler System of Ventilation.

QUESTION: What is the Wheeler system of ventilation?

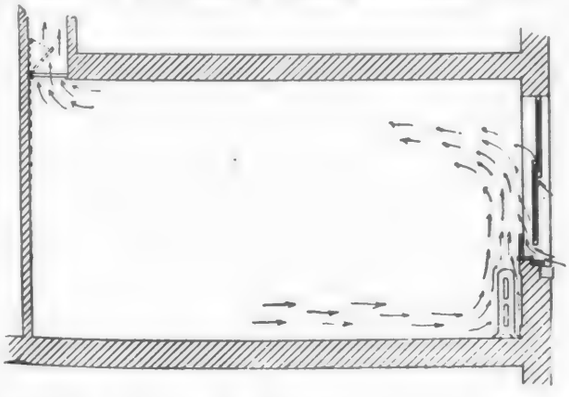
ANSWER: The foregoing inquiry was evidently suggested by the ventilation tests that are being made in the Whitney School, in Minneapolis, by the Minneapolis Board of Education. In this school five rooms have been equipped for experimental purposes with different types of ventilating apparatus, one of which is the so-called Wheeler open-window system.

The Wheeler system has been described as a natural upward



ARRANGEMENT OF RADIATOR AND AIR INLET AT WINDOW WITH WHEELER SYSTEM.

vacuum method of ventilation, as contrasted with the downward plenum method. The principal features of the system may be seen from the accompanying illustrations. At least one outlet is provided at the ceiling of each room. This outlet connects to a ventilating flue leading out through the roof in as straight a line as possible. The outlets are usually provided with dampers at the ceiling to regulate the outflow of air.



WHEELER SYSTEM OF VENTILATION, WITH OUTLET AT CEILING.

It will be noted that the ventilating flue is on the opposite side of the room from the heater. This is considered essential as providing a general air circulation in the room. The location of the outlets at or near the ceiling is also considered of the utmost importance with this system.

Air from outdoors enters the room through open windows. The course of the air is directed upward by window shields placed on the sills. With this arrangement the radiators are placed directly under the windows and in every case extend the full width of the window. The volume of air rising at the radiators is much more than escapes at the outlets and, this it is stated, results in a mild circulation throughout the room.

Again, the air escaping through the outlets creates a slight diminution of air pressure in the room, forming what is called a vacuum system of ventilation, so that the tendency is for air to enter the room at the windows.

Arguments for locating the outlets at the ceiling, rather than near the floor line, are based on the premise that carbonic acid gas (carbon dioxide) is not heavier than air, especially when in a warmed state, and that it may be removed as easily at the ceiling as at the floor, at the same time complying with natural laws for air circulation.

Points on Fuel-Oil Heating.

QUESTION: I shall be very grateful to you for any information you may give me on the following questions:

1. Is crude oil a practical fuel substitute for coal for a water heating plant in a 12-room house?

2. Will it give sufficient and satisfactory heat, easy to regulate?

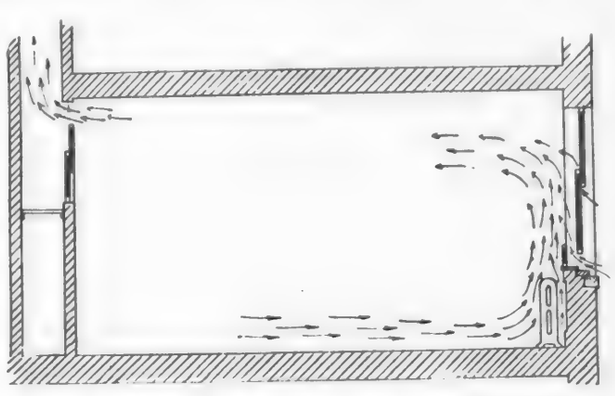
3. What is the comparative cost between burning oil and burning coal?

4. Are there any other satisfactory fuels for small heating plants for homes? What companies will install them?

ANSWER: 1. Crude oil, by which most people designate fuel oil, is an ideal fuel for heating either a small house, an automatic hot water supply, a large house, a greenhouse or any isolated plant where considerations of labor convenience and cleanliness are important.

Technically speaking, crude oil is not a safe fuel, as it contains gasoline, kerosene, etc., just as it comes from the well, and by reason of the presence of these light oils, its flash point is so low that it, or its gases, might be ignited by chance. The use of crude oil (as it comes from the oil well) is prohibited generally.

However, fuel-oil is safer than coal, as all the light oils and gases have been driven off in the refining process and only the



WHEELER SYSTEM OF VENTILATION WITH OUTLET IN WALL NEAR CEILING.

residue reaches the user. This residue is odorless, not subject to spontaneous combustion and cannot deteriorate. Hundreds of successful installations prove the adaptability of ordinary cheap fuel oil as a substitute for coal.

2. Sufficient heat from fuel-oil may be absolutely relied upon if the boiler or furnace gave sufficient heat formerly with coal. In fact about 30% excess capacity may be developed with fuel-oil in any boiler, since the combustion is far more perfect than with coal, and since the air and gases passing through the furnace are only about 60% of the air and gases used in developing the same amount of heat with coal.

The regulation of a good fuel-oil burner is automatic. The owner need pay little or no attention to regulation other than to open or close the oil valve slightly when changing to a lighter or heavier grade of oil. The flame should always be adjusted initially to give complete smokeless combustion at a rate sufficient to fill the combustion chamber with rolling circulating flame which will heat the boiler at the desired rate. This rate of heating is always faster than can ever be required continuously by the house, so that when the required temperature has been reached a thermostat, located in the living room, dining room or library, automatically stops the machine supplying oil and air. Such thermostats usually operate on a range of 1½°, hence if set to 70° the machine is stopped when the house reaches this temperature and is started automatically when the house cools to 68½°. In most houses with water, steam or vapor heating systems, in severe weather, the machine will operate thirty minutes to an hour and will then be idle for an hour to two hours. The average operating time for a heating season is four hours out of twenty-four. Of course, when the machine is idle there is no flow of oil or waste of heat or power.

Since the combustion is adjusted initially to the correct condition for the boiler in question, and no further adjustments are made, it follows that correct combustion recurs whenever the machine is started and the heating plant always operates at maximum efficiency. The varying time of operation controlled by the heat demanded by the house as evidenced by the room thermostat fixes the total heat delivered to the house.

An automatic heat control based on steam pressure or water temperature can never be satisfactory as the proper steam pressure for outside weather—10° would give far too much heat at 30° F.

3. The cost compared with coal varies with the local cost of oil and coal and the grade of coal used. Adding the cost of electricity and pilot light gas (costing about $2.50 per month total) to the cost of oil, the general statement may be made that oil at 6c per gallon is about equivalent to coal at $8.50 per ton. In cases where money must be spent to fire coal and remove ashes and clean up, this cost should be subtracted from the relative cost of coal in making such a comparison.

One owner of a 12-room house reported that his fuel cost for 1921-22 was $149.00 on oil at around 6c per gallon against $250.00 for buckwheat anthracite coal for 1920-21.

4. Other satisfactory fuels for small heating plants only are kerosene, distillate and gas-oil. These fuels cost from 25% to 100% more per gallon than fuel-oil and have less heating value per gallon. The heating value per gallon varies inversely with the gravity of the oil. Most so-called fuel-oil burners are only suitable for these light oils and at the present time in some locations only light oils are available. Any burner operating perfectly on standard fuel-oil of 24° to 26° Baumé gravity will operate on lighter oils for the reason that the atomizing of heavy oils is much more difficult.

No oil burner has yet been perfected which can be "turned down" low enough to give the low heats and "turned up" high enough for the high heats: First, because the required range is too great; second, because of the fact that a tiny stream of oil is not constant; and third, because it is extremely difficult to burn a very small amount of oil unless the combustion chamber is correspondingly reduced, which is impossible.

CHATS WITH UNCLE BEN

Heating with Ceiling Radiators.

"Uncle Ben," said I, "they have been badgering me for an opinion on the following point: I have it typewritten down on this sheet of paper so that you will surely understand it:

"'A building can be heated to 70° in zero weather if say, 5000 sq. ft. of pipe coils are installed on the outside walls under the windows.

"'The installation of tools, benches, etc., forbids such an arrangement and the coils must be located along the outside walls, but overhead near ceiling. What percentage should be added to the 5,000 sq. ft. of coil surface to maintain the same temperature requirements?

"'I have looked over a number of late writers on the subject of heating buildings, but I fail to find any reference to a rather common arrangement like the one in question.'

"Now, as far as I know, if any fellow ever did put 5000 ft. of radiation in a factory around the walls near the floor and found it worked, then moved the same old 5000 up overhead, and told anybody how he came out, I never heard tell of it. What do you think of it?"

Uncle Ben brushed off a clean spot on his bench, lighted his Missouri corn cob pipe that he keeps out there to remember Jim Donnelly by, and said:

"I mind old man Osborn, who used to be a big heating engineer around Chicago. He was mixed up with the old Consolidated Engineering Company. According to him, overhead was the only place to put direct radiation in a factory. He claimed that the radiant heat from it would pass down to the metal lying around on the floor to the lathes and presses and such, heating them up so that they'd warm the air which rubbed over them and become regular radiating surfaces. He used to get away with it, too, in a great many big jobs. I always believed that the real reason they got away with it was because maybe there was enough belts and pulleys and fly wheels and things to keep the air circulating up around the radiators. Besides, in most factories they don't want it too all fired hot right where the men are. I know hardly anything more criminal than to make a poor mechanic work at a bench which is above a radiator.

"Of course heat is lost faster as the difference in temperature between the hot thing and the cool thing increases. Put the radiator up high and near a cold roof or skylight and put enough of it in even to get the floor warm and it will probably be 30° or 40° hotter up there than at the floor. If the radiation is down lower there will probably be considerable less difference in temperature between floor and ceiling.

"If the building your friend is badgering you about is several stories high and the ceilings are not so very lofty I'd say for all the intermediate stories he'd do well to put the radiation near the ceiling and not add a single per cent to it. If it's a one-story building with skylights, I'd say he could figure out pretty close what his total heat transmission would be at the average maintained temperature, then assume that the entire roof and skylight, or call it top, loss would be increased by the amount he'd lose if it were 20° hotter inside. Add enough radiation to carry this, and hang it at least 12 in. below the ceiling.

"For a good many years I have figured school house and church basements that had to be heated with ceiling radiators, and have added for such 25% of the normal amount of floor-type radiation. I don't know as I've ever had to go back and add any more. It is a sloppy looking job to do, putting ceiling radiators in decent finished up rooms, no matter how it may be in a factory. I don't do it at all any more if I can help it. I make them give me a flue where I can take cool

air from the floor, let it rise up through the radiators in the form of pin indirects, and pass back into the room, recirculating. The two registers look a great sight better than the ceiling radiators, and I believe each 100 feet of surface does more work that way. Try it yourself some time. Tell your inquiring friend to come back with more specific dope on the exact conditions pertaining to his 5000 sq. ft. factory, and I'll see what *this* late writer can do for him.

"I can't forget the old Hart-Parr factory out at Charles City, Iowa. They had a glass wall and top structure, shaped like a circus tent. Up where Ringling hangs the cluster of arc lights they had a lovely trombone wagon-wheel spider-web (get me?) effect of 1-in. pipe, being a steam coil—several of them. Up above each of these was a fine big galvanized-iron windmill wheel with axle vertical, spun around by a little twisted belt motor hung up there on sky hooks. The windmills drove the air down through the network of pipes and they just heated that old gas engine factory to the queen's taste! Wish I had a picture of it. I tried to get one, or to keep track of that installation, but some one said it had burned down. They had the right idea, and while that was twenty-five years ago the present unit heater crowd are just arriving at it."

THE SMOKELESS BOILER SITUATION IN CLEVELAND AND CINCINNATI

In spite of the fact that the new smoke ordinance in Cleveland apparently permits the use of both updraft and down-draft smokeless boilers, it is evident that the attitude of the authorities against up-draft smokeless boilers has not undergone any material change. The new ordinance states distinctly that "where internally-fired steam or hot water boilers or where hot air furnaces are to be installed for heating, the boilers, or furnace, shall be equipped with a down-draft, under-feed *or other type of smokeless furnace* in which the combustion is completed before the products of combustion reach the flue surface of the boiler and shall be approved by the commissioner of smoke inspection."

The attitude of the commissioner of smoke inspection, Mr. Filkins, is expressed in the following statement, made subsequent to the passage of the new ordinance.

A Statement by the Smoke Inspector of Cleveland.

Since I assumed my position as Smoke Commissioner, it seems that my office has been besieged considerably by salesman of smoke-preventing devices of all characters. A large number of these salesmen represent the new types of so-called smokeless up-draft boilers. Undoubtedly some of the boilers of this type possess some merit, but I notice by the illustrations presented by these salesmen that quite a large number of them are improvised from old patterns of boilers, and without going into the question very deeply, it seems to me that it would hardly be possible for practically every boiler manufacturer in the country to make a successful smokeless up-draft boiler by merely cutting a hole in the side of some of his old types of boilers. I could see how one or two might do this and get away with it, but I cannot see how all of them are able to do it, and I have noticed without exception, all of these boilers are improvised in this way.

Among engineers interested in combustion problems quite a controversy has been waged the past few weeks in regard to the merits of the new air in-take devices designed for the smokeless combustion of soft coal in low-pressure heating boilers.

Several years ago the down-draft furnace was applied to cast-iron boilers, and, so far as the down-draft principle was involved, it has been eminently successful, although there have been, of course, some cases of only modified success due to faulty application of the principle.

USE OF AIR-ADMISSION TYPES OF FURNACES IN THE POWER FIELD.

The discussion on this subject is reminiscent of the arguments which were indulged in for and against air-admission types of furnaces, which were introduced in the power plant field, when the question of smoke abatement first assumed importance. At that time, quite a number of furnaces designed to permit the introduction of secondary air, were put on the market, and the advocates of each were just as enthusiastic over its advantages as are the advocates of the same ideas when applied to cast iron boilers.

Attempts were made to introduce air into the furnace at every imaginable point along the route of the gases of combustion, from the firebox to the breeching. These furnaces were all more or less successful as smoke-prevention devices, when operated by expert firemen who recognized the limitations of the devices and operated each furnace in the manner calculated to produce the best results. When placed in the hands of inexperienced or careless operators, however, their smoke results were more than doubtful.

CHALLENGES SMOKELESS OPERATION OF SINGLE-GRATE BOILERS.

A great amount of intelligent study has been given the problem of smoke elimination in the large modern power plants but in spite of the fact that there are a great many more small units than large ones, the right amount of attention has not been given the problem of smokeless operation and this is especially true of the heating boiler manufacturers only to the extent of calling their surface-fired up-draft boilers smokeless and they know it is impossible to build a foolproof single-grate smokeless boiler.

With the down-draft furnace, the coal being fired into a relatively cool fire-box and progressing first into a zone of slow distillation and then into a zone of more rapid distillation down to the lower firebox, in which the carbon is burned, the air demand is practically constant, so that no manipulation of an air-admitting device is necessary.

From my experience I have found it necessary for the gases to be driven down through the hot coals in order to consume the smoke and the only way it can be accomplished is with a down-draft double-grate boiler and not a surface-fired boiler where the fresh fuel can be thrown directly upon the hot fuel bed.

WHERE THE SMOKE INSPECTOR FIGURES IN THE ARGUMENT.

The sum and substance in the up-draft and down-draft boiler argument is nothing more than selling a method of firing. You can fire an up-draft boiler any old way you like, just as long as you get the coal into it, and it will smoke and also make steam. Then it is up to the smoke inspector to correct the evil. But try to fire a down-draft boiler any old way you like and you will get smoke, but not steam. Then it is up to the boiler manufacturer.

I believe that when a man sells a boiler and calls it smokeless, he should stand by it and see that it is smokeless.

W. D. Filkins,
Commissioner of Smoke Inspection.
Cleveland, O.

The Situation in East Cleveland

The course of events in East Cleveland in connection with the use of up-draft and down-draft smokeless boilers is outlined in a statement made by John A. Cowing, of the Department of Smoke Abatement in East Cleveland. "Through observations made of existing plants," writes Mr. Cowing, "it was apparent that the ordinance and policy as set forth below, were the only means of preventing smoke. As a result, the elimination of the smoke nuisance in the city of East Cleveland has been successful in new installations of heating plants.

The Department of Smoke Abatement requirements for equipment, and the present stand taken, is clearly defined in the following extract from the Fourth Annual Report of the City of East Cleveland, under "Heat and Power Plants," for the year ending in 1921:

"After the enactment of the Smoke Abatement Ordinance, the department permitted to be installed several of the so-called smokeless, surface-fired, up-draft boilers. Under actual working conditions, it developed that this type did not eliminate smoke. For some time past, the department has only permitted a down-draft, under-feed or other type of smokeless furnace in which fresh fuel is not thrown directly upon the hot fuel bed.

"The interpretation of the Smoke Abatement Ordinance has resulted in considerable friction between the department and the representatives of various boiler manufacturers.

"An investigation of a number of plants in East Cleveland, Cleveland, Lakewood and Cleveland Heights was made, and a report submitted. Officials and others interested in smoke abatement were consulted in an endeavor to obtain an unbiased opinion as to the merits of various types of boilers. The present regulations in force are the result of these investigations and it is believed will result in an abatement of the smoke nuisance, and will result in a saving to the owner in fuel and attendance sufficient to offset any difference in original cost of equipment."

The Smoke Prevention Campaign in Cincinnati.

The attitude of the Cincinnati Smoke Inspection Department towards the general subject of smokeless boilers and especially the use of the up-draft types, is expressed by Gordon D. Rowe, chief smoke inspector, who writes, under date of August 18, 1922:

"The section of the Cincinnati Anti-Smoke Code, passed August 3, 1915, relating to the installation of cast-iron heating boilers was so worded so as to prevent the use of anything but down-draft boilers for buildings containing over 1200 sq. ft. of steam or 2000 sq. ft. of water radiation. Through the instrumentality of the manufacturers of a certain up-draft boiler, a councilman-at-large was prevailed upon to introduce a modification allowing the installation of smokeless up-draft boilers of like capacity. The latter took effect June 26, 1917, and was passed by the council against the protest of the chief smoke inspector.

"My idea at the time was not to be so precipitate in the matter and open the gates of the city to a flood of presumably smokeless up-draft boilers, but instead, to issue experimental or test permits for each up-draft boiler which was claimed to be smokeless, the duration of the test to be a heating season's run. Then if the boiler under test was found to meet the requirements it would be formally approved and given entry into Cincinnati.

The action of the council, of course, prevented the above-mentioned method being used, and Cincinnati immediately became flooded with so-called smokeless up-draft boilers, some of which are smokeless and some of which have no smokeless qualifications except in the minds and claims of the manufacturers and salesmen. It is needless to say that this condition has resulted in increasing the labors of this department, and, as far as heating plants are concerned, nothing but bulldog pertinacity has prevented a reversion to the disgusting conditions which prevailed in our city before the enforcement of the anti-smoke laws.

"It is quite possible to make a smokeless up-draft cast-iron boiler if the baffles therein are of fire-tile and arranged to mix the air and gases, as well as hold up the temperature, and some of them are so constructed. Others have nothing but a cast-iron baffle in the rear of the fire-box through which air is admitted.

"The admission of air at the rear of the fire is obviously wrong. It should be admitted at the front of the fire to give it a chance to combine with the volatile hydrocarbons before reaching the gas passages.

"Indeed, some of the boiler manufacturers who tried to install their boilers in Cincinnati have had nothing whatever but a straight up-draft boiler with a few fire brick at the back end of the grate. Others have what they call a drop section which, being water filled, prevents raising the temperature to a point where it will promote combustion.

"The Cincinnati Anti-Smoke Code does not regulate the dimensions of chimneys for heating boilers, and it has been customary for this office to require chimneys of the dimensions prescribed by the various heating boiler manufacturers under the supposition that the manufacturer of a heating boiler would naturally prescribe chimney dimensions which would make his boiler efficient.

"We have found that this did not work out properly, as some of the boiler manufacturers, probably in order to throttle competition, cut down the height of their stacks. It is quite obvious that our ordinance must be amended to govern the area and height of heating boiler chimneys, as well as power plant stacks, and it is time that the National Smoke Prevention Association, the National Board of Fire Underwriters, the A. S. M. E. and the American Society of Heating and Ventilating Engineers got together on the proposition of a national ordinance for chimney and stack construction.

"The smoke prevention work in Cincinnati has been going steadily ahead. The last four years has seen a 60% decrease in soot fall. The power plants and locomotives are well in hand, but we still have the heating plant problem.

"Bituminous coal is logically our fuel, and all heating boilers should be so constructed as to make the economical smokeless combustion of soft coal possible.

"When heating boiler manufacturers cannot sell anything but smokeless boilers, they will immediately enter into the manufacture of such, and not before."

Coal Production and Underground Supply in the United States and the World.

Recent developments in the coal industry of the United States lend interest to some figures of world coal production and consumption presented by the *Trade Record* of The National City Bank of New York. They show that the United States, which has more than one-half of the underground coal of the world, supplied 42½% of the world's coal output from the beginning of the war to the end of 1920 as against an annual average of about 38% in the years preceding the war. In 1921, however, with the big fall off in our own output, we supplied but about 40% of the world's coal production, though in the immediately preceding year, 1920, our share of world production was 45%.

The existing underground coal supplies of the world, or "reserves" as they are called by the geologists, were estimated by a World Geological Congress which met in Canada in 1913, at 7,397,283,000,000 metric tons, of which that of the United States was put at 3,838,657,000,000, or about 52% of the total; Canada at 1,234,269,000,000; China, 995,587,000,000; Germany (in 1913) 423,336,000,000; and the United Kingdom 189,533,000,000. Nearly all of the known coal of the world lies north of the equator.

Coal consumption in the United States averages, for the entire year, over one million tons per day.

The Heat Value of Corn.

A series of tests to determine the heat value of corn has recently been conducted by the Engineering Department of the University of Nebraska and is reported in *Power*, of New York, for August 8, 1922, by William L. DeBaufre, of the mechanical engineering department of the university.

The test covered four varieties of corn, Hogue's Yellow Dent, University No. 3, Blair White and Nebraska White Prize. They were taken as husked from the field, without selection. To determine the amount of moisture in both grain and cobs of each variety they were weighed before and after drying in an oven at constant temperature. The various samples were finely ground and placed in a bomb calorimeter for the test.

The average higher heat value of dry corn was 8159 B. T. U. per pound and of dry cobs, 8101 B. T. U. per pound. The average lower heat values were 7579 and 7577 B. T. U. per pound, respectively.

For fully-cured corn containing, say, 10% of moisture the effective (lower) heat value is approximately 6700 B. T. U. per pound. A corresponding value for Pittsburg, Kan., coal is 11,800 B. T. U. per pound. Consequently heat value of 50 bushels of corn on the cob or of 63 bushels of shelled corn is about equivalent to that of 1 ton of bituminous coal. With coal at $10.00 a ton the price of corn on the cob must be less than 20 cents a bushel of 70 lbs., and of shelled corn less than 16 cents a bushel of 56 lbs., to make it more economical to burn corn than coal. One of the points brought out by Mr. DeBaufre is that while corn shrinks in financial value during storage by reason of loss in weight, this loss of moisture increases its value for heating purposes.

Wood Fuel Resources in New Jersey.

"There are 2,000,000 acres of forest land in New Jersey capable of producing at least 5,000,000 cords of wood without using any timber which would be more valuable for other purposes," states W. M. Baker, associate State forester. "In fact, the removal of this wood would improve the forests."

A cord of heavy wood, such as oak, hickory, beech, birch, or sugar maple, has the heating value of a ton of coal; a cord of lighter wood, such as chestnut, pine, or red maple, equals two-thirds of a ton of coal. To be as cheap as wood at $8 a cord, coal must sell for from $8 to $12 per ton delivered.

CORRESPONDENCE

Meeting a Challenge in Water Heating Practice.

EDITOR HEATING AND VENTILATING MAGAZINES

In the correspondence of Mr. F. Broadhurst Craig, published in your August issue under the title of "A Challenge in water Heating," Mr. Craig apparently takes exception to my statement in your May issue that one of the causes of circulation in a water heating system is "expansion." He says, "The expansion force does not contribute one iota to the maintenance of circulation." Now, no such statement was made in my article and as his premise is wrong, his conclusions would undoubtedly also be wrong. Unfortunately he does not work to any conclusion, but brings up the question of "air locking" or air traps, as we are accustomed to say. On this point I can certainly agree with him.

What was said in my article was that one of the causes of circulaton was "expansion" not "expansion force" which may be, and in this case is, quite a different thing. If he continued to read along through the article he would have noticed that the actual forces producing circulation were quite definitely explained and defined.

If these forces are not the result of expansion it would be interesting if Mr. Craig would explain what they are due to. Or, putting it in another way, it would be most interesting if he would describe a gravity system in which expansion was not present. I make these suggestions in view of Mr. Craig's remarkable statement that, "Beyond an initial movement in the direction of the expansion tank when the water is first heated, the effect of expansion is valueless for the purpose of practical circulation."

UNBALANCED FORCES IN WATER HEATING SYSTEMS.

Mr. Craig's bald statement that "there aren't any unbalanced forces in a water heating system," is, I confess, amazing to me and until he explains how motion can take place except through the action of unbalanced forces I am at a loss to understand his statement.

As Mr. Craig evidently holds some very interesting views, I would suggest that he explain his theory of the cause of circulation in a gravity water heating system.

RELATION OF RISER SIZES TO NUMBER OF RADIATORS.

Mr. Craig suggests that he and I each design a gravity water heating system from identical data and that the quantities involved in each case be priced by a disinterested party, his idea being to see which system would be the least expensive. This discussion arose from my comment on a statement in one of Mr. Craig's articles. The statement is as follows: "The area of the main pipe need not necessarily be equal to that of the combined radiator valves. In certain instances, as for example, a one-pipe drop system, three or four 1-in. radiator valves may be served by a single branch main of 1-in. diameter."

If Mr. Craig intends to go ahead and design his system using 1-in. risers in a four-story building, each riser to supply four radiators, each with a 1-in. valve, then there is certainly no use of either of us spending any time in laying out a system, for I will concede at once that his system will be very much less expensive than anything which I could design.

It is always interesting to study the practices followed by different engineers, and I would like to be able to study Mr. Craig's design, not necessarily from the standpoint of cost alone, but also from the viewpoint of design.

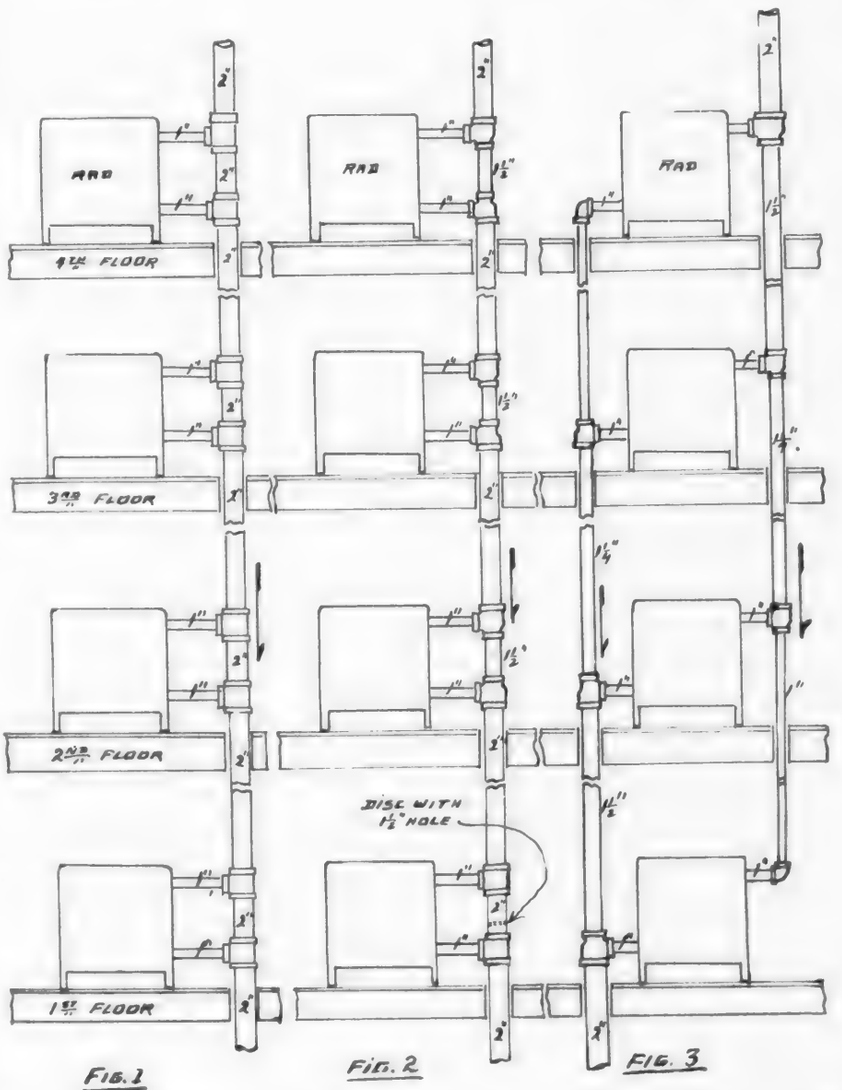
DESIGN OF DROP RISERS FOR FOUR-STORY BUILDING.

As the matter seems to be narrowed down to drop risers in, say, a four-story building, it might be interesting to compare practices in this respect.

I assume that the system under discussion is a gravity hot water system with an over-head supply main in the attic and a return main in the basement, the design of the vertical risers between these mains being the point at issue. Assuming such a system I have used three practical and satisfactory methods which are shown in Figs. 1, 2 and 3.

It is assumed that we have a four-story building and that on each floor there is a radiator of such a size that it requires a 1-in. supply and return connection. We are justified in making this assumption and we do not need to know the actual size of this radiator or its transmission coefficient, or anything of that kind. The information given on the sketches is adequate for our purpose.

In Fig. 1 it will be noted that the drop riser is of 2-in pipe throughout its length. In other words its area is equal to the sum of the valve areas of the radiators



TYPICAL DESIGNS OF DROP RISERS FOR A GRAVITY WATER HEATING SYSTEM IN A FOUR-STORY BUILDING.

which it serves. Such an arrangement gives satisfactory circulation through the radiators. It is quite true that it would be possible to make the drop riser, say, of 1½-in. pipe, but in this case the proportions would be such that the radiators would not heat quite as uniformly as with the larger pipe. If the drop riser was made even smaller, or 1-in., as Mr. Craig suggests, I would be very skeptical of the radiators heating with any degree of satisfaction.

DIFFICULTIES DUE TO PROGRESSIVE COOLING.

The difficulty here is the progressive cooling from the upper to the lowest radiator. It is evident that this cannot be avoided with this type of riser design, no matter what the pipe size may be. There would be circulation if the risers were of 1-in. pipe, but the lower radiator would be much cooler than the upper one. It has seemed to the writer that (in this case) a 2-in. riser which equals the combined valved areas would be the best all-round compromise. It carries sufficient water to reduce the progressive cooling to within practical limits. It is imaginable and, of course, possible to increase the riser size even more, or to a point where the progressive cooling mentioned would not be noticeable. Such increase is evidently not practicable.

It has been found that in some cases, due possibly to friction or from stoppage due to foreign substances, one or more radiators would appear to be by-passed and not heat properly. Where such conditions exist or where more positive circulation is demanded the arrangement shown in Fig. 2 has been followed.

It will be noticed that in this case the pipe size between the supply and return tees serving one radiator is less than the rest of the riser. Its size should, of course, be such that its area, together with the area of the radiator supply, is equal to the area of the riser. We are limited as to the number of available pipe sizes so that it is not always possible to arrive at just this balance.

USE OF DISCS IN HOT WATER LINE.

A more accurate method is to insert in the riser between the above-mentioned tees a disc having in it a hole of the proper diameter. This will allow the drop riser to be of uniform size throughout, and will make a very workman-like looking job. I have indicated such a disc in connection with the lowest raditor in Fig. 2.

DIFFICULTIES DUE TO INEQUALITIES OF TEMPERATURES IN UPPER AND LOWER ENDS OF RISER.

However well the arrangements shown in Figs. 1 and 2, may be designed and installed there will always remain the difficulty due to inequalities of temperature between the upper and lower ends of the riser.

In order that whatever slight inequalities of the kind mentioned may be eliminated, I have frequently used, and preferably so the arrangement shown in Fig. 3. The operation with this arrangement is, I believe, self-evident. It may be noted that in this case each radiator gets its water at practically the same temperature, and there is no conflict due to opposing water currents. The pipe sizes in this case are not ideal but will serve for purposes of illustration.

It would seem that this arrangement is ideal from the standpoint of operation, and its expense is not a very great deal more than either of the other methods.

No valves are shown in the radiator connections. They may or may not be used but they do not materially affect the results.

The arrangements shown are comparable with the series and parallel arrangement of electrical circuits and interesting deductions may be drawn by any one familiar with such circuits by comparing temperature drops in the water circuits with voltage drops in similar electric circuits.

As a matter of fact I believe that there are comparatively few cases in this country where a four-story building of any size would be heated by a gravity water system. Our tendency in cases of this kind would be toward vapor or steam. It would be interesting if other designers would give their experiences with water installations similar to those under discussion.

WILLIAM F. DEVENDORF.

Rochester, N. Y.

Ventilation Code Proposed as "American Standard."

A movement is under way to have the code for the ventilation of public and semi-public buildings of the American Society of Heating and Ventilating Engineers approved by the American Engineering Standards Committee as "American Standard." This code, which was adopted by the heating engineers' society in 1915, is familiar to most of our readers. It was prepared by a committee of the American Society of Heating and Ventilating Engineers at a time when the ventilation of motion pictures and similar quarters was very much in the public eye. At first the program was laid out to meet the requirements for such theatres, but, as finally compiled, the code was made to cover all classes of buildings. Section 1 relates to general matters pertaining to all classes of buildings. The three remaining sections relate to schools and colleges, factories, and theatres, respectively.

Among the States which have utilized parts of the code in their regulations are: Illinois, Indiana, Kansas, Massachusetts, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Utah, Virginia and Wisconsin.

A committee headed by Sidney J. Williams, chief engineer of the National Safety Council, has been appointed by the American Engineering Standards Committee, to investigate the status of the code in the industry and the desirability of approving it. The other members of this special committee are: A. S. Armagnac, editor of THE HEATING AND VENTILATING MAGAZINE; W. R. Addicks, American Gas Association; M. W. Alexander, National Industrial Conference Board; L. W. Chaney, Bureau of Labor Statistics; C. B. Connelley, Association of Governmental Labor Officials of United States and Canada; E. A. Holbrook, Bureau of Mines; Sullivan W. Jones, American Institute of Architects; M. G. Lloyd, Bureau of Standards; C. L. Riley, Clark, MacMullen & Riley, representing the American Society of Heating and Ventilating Engineers; G. E. Sanford, American Society of Safety Engineers; David Van Schaack, Safety Group, Aetna Life Insurance Company; and R. C. Williams, representing the United States Public Health Service.

The American Engineering Standards Committee, it is announced, will be very glad to learn from those interested of the extent to which they make use of this code, and to receive any other information regarding the code in meeting the needs of the industry.

Apprenticeship Problem Being Tackled on a National Scale.

Those in the heating contracting field are well aware of the universal shortage of skilled mechanics that is apparent on every hand, not only in the steam fitting industry, but in the plumbing, sheet metal and allied trades. In fact, the shortage of skilled mechanics has become more acute each year. It was shown for instance, recently that out of ten trades surveyed, six actually registered a loss during the ten-year period from 1910 to 1920. One reason given as having prevented many young men from going into the building industry is the intermittent employment. There is not only the loss in time to be considered, but the demoralizing effect of being out of work due to weather conditions, shortage of material and various other reasons.

Another important reason has been the attitude of the labor unions in making it increasingly difficult for boys to become apprentices. Nearly every contractor has wanted at times to put on additional apprentices only to be informed that his quota was filled. It is also true that many steam fitting contractors have let the apprenticeship problem go by default, but this is partly because of the difficulty in securing young men of sufficient strength to handle the heavy work involved in pipe fitting. It is maintained that the advancing wage scales in many places, in spite of the fact that living costs are coming down, are directly due to the results of this shortage in apprentices. At the same time, the clerical field is overcrowded and it is no doubt true that there has been a tendency in recent years to shun anything that looked like manual labor.

A writer in the *American Contractor*, A. W. Dickson, executive secretary of the National Building Trades Employers' Association, in offering a solution of the problem states:

"Congress took a long step forward when in 1917 the Smith-Hughes law was passed, which summarized reads as follows: An act to provide for the promotion of vocational education, to provide for co-operation with the States in the promotion of such education in agriculture and the trades and industries; to provide for co-operation with the States in the preparation of teachers of vocational subjects; and to appropriate money and regulate its expenditure.

"For the fiscal year ending June 30, 1923, there will be available the sum of $1,750,000 for the purpose of vocational education, distributed proportionately between the various States. In many cities the contractors have taken advantage of the opportunity of establishing trade schools for mechanics and the results are highly gratifying. In Cleveland a class is about to be established and 100 boys have signed up for the course. In Los Angeles a class is being conducted for plasterers. San Francisco has had a number of classes under way for some time. Youngstown, Ohio, established classes in bricklaying, plumbing, electrical work and sheet metal work last year and the results were very satisfactory.

"Contractors in many places have failed to avail themselves of the opportunity to establish such classes, and as a result the industry is suffering at the present time.

"The Federal Board for Vocational Education at Washington, D. C., is the official representative of the government in this matter and any group of contractors interested can secure additional data by communicating with that body."

Summer Meeting of British Heating Engineers.

A proposal that additional meetings of the Institute of Heating and Ventilating Engineers be held was one of the suggestions brought forward by President A. H. Barker, at the summer meeting of the institution, in Oxford, England, July 4. At present three regular meetings are held during the year.

Another suggestion contained in the president's address was the formation of a technical library for the use of members. It was proposed to start the collection by inviting donations of books and pamphlets from public-spirited members. Those possessing useful literature on heating, ventilation and kindred subjects, were asked to lend a hand by contributing what they could spare.

In his report on research work, Edgar Herring, chairman of the research Committee, stated that after much delay the Government Department of Scientific and Industrial Research had decided not to sanction the project of making heat transmission tests on thin building materials. As a result, the Research Committee had been unable to make any progress in this direction.

Since the last report, the work has been confined largely to the continuation of experiments on the heat transmission of a standard type of radiator and further investigation of the efficiency of non-conducting compositions.

At a recent meeting, the report continued, the committee called upon the council of the institution to impress upon radiator manufacturers the desirability of rating heating capacities on a B. T. U. basis per section instead of the present square foot rating which, it was felt, in the absence of efficiency factors, was practically valueless.

An interesting paper was presented by Sir W. M. Bayliss, Professor of General Physiology at University College, London, on "Self-Regulating Mechanisms of the Human Body, with Special Reference to Temperature."

For the Boiler Rating Committee, W. W. Nobbs, chairman, stated that a number of favorable replies had been received to the proposition of developing a standard method of rating domestic water supply boilers.

Heating Opportunities in South America.

Some interesting sidelights on the conditions in South America in connection with the heating of homes and public buildings are contained in a recent letter received from H. A. Erickson, formerly connected with the heating contracting firm of Almirall & Company, New York, and who has been acting as assistant engineer on the S. S. West Camak. Mr. Erickson writes from Buenos Aires:

"I have been down on this coast for the past two months, taking in all the important ports of Brazil prior to landing in Buenos Aires. This is the bon ton city of them all, the New York of South America, and the name is quite correct. One thing, very noticeable in all the large cities along the coast, is that they did not overlook the beauty effect in their buildings. The main streets are all laid out in park effects and the street lighting is surely wonderful.

"Buenos Aires is the only city along the coast with buildings over eight stories and they are now going in for high ones, but not of a plain exterior.

"There is little heating work done in Buenos Aires. The population has not awakened to the comfort of it as yet. Standard oil heaters or electric heaters are the usual method but I feel in a few years this will be one of the greatest markets for heating equipment. The one-pipe heater should be a winner down here. Of course the trade will require development and what strikes me is that our manufacturers have held back on this field."

Effect of Air Conditioning Advances on the Cotton Industry.

How air conditioning is really the determining factor in the fight of the New England cotton mills for their existence is told in a striking article in *The Industrial Digest* for June 24, 1922. Cotton manufacturing, it is stated, was formerly confined to localities where naturally moist atmospheric conditions permitted weaving and spinning. So our cotton mills sprang up in New England just as England's industry centered in Lancashire. But with the development of apparatus for artificially moistening or conditioning the air in the mill, new plants were built near the raw material source without regard to weather conditions.

Since the 1880's the cotton industry of the South has been growing steadily. The invention of apparatus to humidify the air artificially in the mills so that cotton could be kept in the proper condition during the process of manufacture caused the industry in that section to advance with tremendous rapidity. Under the stimulus of war conditions it reached the point where it was consuming 55% of the cotton used in the United States. While the demand for cotton was kept up by the war and by the post-war boom, the competition between New England and the South was not deadly. There was a market for all the goods that both sections could produce. When the slump came in 1920 the textile industry began to realize its position.

The story of the development of the cotton manufacturing industry in the South and the advantages enjoyed over the Northern competitors was told by George S. Harris, president of the Exposition Cotton Mills, Atlanta, in an address at the Spring meeting of the American Society of Mechanical Engineers.

"Before the successful development of the humidifying apparatus,' said Mr. Harris, "cotton mills were confined to certain localities in which could be found natural atmospheric conditions permitting weaving and spinning. This very largely accounts for the large number of cotton mills in England and later those in our New England States. In the Southern States the hot, dry summer so necessary to the growth of cotton did not encourage the spinner, and the few mills we had in the old days were located on the banks of rivers for the dual purpose of supplying power and natural humidity. Some mills were scattered over the South, but the real growth was in New England."

Then came the development of apparatus for artificially keeping the air in the mill at the correct degree of humidity and temperature. Mills no longer needed to be built to suit weather conditions. The South was the logical center for new mills.

Moving An 88-Ft. Chimney.

The removal of a brick stack 88 ft. high and weighing 120 tons, to a new base 9 ft. away, is a feat which was recently accomplished in Portland Me. The details are given by J. H. Danner in the *American Contractor* for August 12. The diameter of the chimney is 9 ft. at its base and 6 ft. at the top. The new foundation was placed and seasoned some time previously. Holes were then cut into the side of the concrete chimney base and rails were wedged into them so as to take as much weight as possible before the cutting operation began which was to chop off the mass of masonry from its foundation.

A steam drill was used for this purpose and a 2½-in. face on the bits smashed through the concrete inch by inch. No guy lines were used in the moving operation. A 15-ton jack, with a timber backstop chained to the rails furnished the motive power for moving the 120-ton mass. No difficulty of any sort was experienced after all preparations for the moving were made.

The rails on which the chimney has been moved were removed from the inside by cutting. The outside ends project out into the new concrete foundation as reinforcing. More than $2,000 were saved by the omission of guy lines. Walter S. Tingley, of Portland, was the contractor for the work.

SAFE CHIMNEY CONSTRUCTION

According to the Actuarial Bureau of the National Board of Fire Underwriters, defective chimneys and flues are responsible for more property losses than any other of the four divisions into which heating plants are divided in the list of fire causes. Defective chimneys and flues stand third in the list of major fire causes, the list being led by electricity and matches-smoking.

In an abstract of the bureau's report, made by *The American Roofer*, it is stated that during the six years from 1915 to 1920 this "strictly preventable" fire hazard was the cause of $71,037,084 worth of material wealth being destroyed. Allowing 25% for unreported losses and those upon uninsured property, the total is increased to $88,796,-355, which is considered a conservative estimate of the actual losses.

CARELESSNESS INVOLVED.

Bad construction is held to be the chief reason for the heavy damage from the chimney and flue hazard, although carelessness is responsible for much of the trouble. Carelessness figures in the situation when lack of cleaning causes a flue to overheat and start a fire, and when necessary repairs are neglected. Also, when unused flue holes are stopped with papers, rags, boards and other inflammable materials instead of with a metal cap securely held in place.

Statistics show that over 12% of dwelling house fire losses originate from defective chimneys and flues, but the hazard is also marked in many mercantile establishments and small town factories of inferior construction. Schoolhouses, too, have suffered many chimney and flue fires.

The flue is the draft duct leading through the chimney and is connected to the stove or furnace by the smoke-pipe. When flues are improperly constructed upon unsafe specifications, sooner or later fire is liable to ensue.

CAUSE OF CHIMNEY FIRES.

The reasons why chimneys are such a fruitful source of fire have been summed up as follows:

1. Use of terra cotta sewer-pipe or other unprotected tile or hollow blocks for the chimney;
2. Construction of chimney with bricks laid on edge instead of flat;
3. Chimney walls built with brick flatwise or only one brick thick, and flues unlined;
4. Supporting chimney on the timber construction of a building or upon brackets; or insufficient masonry foundation, when the chimney rests on the ground;
5. Two or more connections to the same flue;
6. Building woodwork into the wall of a chimney, or placing it in contact with its exterior;
7. Smoke-pipes arranged to enter a chimney in vertical line;
8. Carelessness in sealing connection between smoke-pipe and the chimney, and failure to anchor the pipe to the chimney;
9. Carelessness in not renewing a rusted smoke-pipe and also in allowing combustible material too near the pipe;
10. Carelessness in not keeping the chimney clean and the joints in the brickwork properly pointed.

A HAZARDOUS COMBINATION.

It often happens that old or improperly constructed chimneys develop cracks in that portion passing through the attic and thus become a continual menace. Sparks fly out into the attic and, owing to the location, a fire so started is likely to gain considerable headway before being discovered.

The combination of a dilapidated chimney and a wooden shingle roof is one of the worst fire hazards that could be devised. The sparks escape through the bricks in such a chimney and find the tinder-like wooden shingles excellent fuel for quick action. Danger also exists at the roof line when the flashing has been improperly installed or when the chimney walls are in direct contact with the roof structure.

As a general thing, protection against fire is comparatively simple and inexpensive, and this is true also as far as safeguarding chimneys and flues is concerned.

Heavy as are the losses from this hazard, it is surprising, in view of the methods of construction prevailing in many communities, that the record is not worse than it is. In a recent defective flue fire in a Pennsylvania city, as an instance, it was found that a wooden joist ran into the flue opening, a careless building practice which is, unfortunately, only too common.

A chimney should always be solidly built upon an independent and indestructible foundation. It should never rest upon wooden construction because this will cause shrinkage and settling, with the result that the chimney is very likely to crack and permit the escape of sparks.

In some parts of the country it is a common practice to suspend a chimney from floor or roof timbers by iron hangers. This is a dangerous custom and should not be permitted.

A chimney wall should never be less than 3¾ in. thick (the width of a standard size brick) and should be lined with chimney tile. This is important, since in the absence of this lining the mortar between the bricks will eventually disintegrate and fall out under the action of heat and the gases of combustion. For these reasons, plaster is not a satisfactory lining as it is sure to crack and fall off in the course of time. Fire clay chimney tile, manufactured for the purpose, is the only safe material and its use adds little to the cost of construction. Excess mortar at the tile joints should be carefully removed so that the flue will present a smooth surface which will create a good draft and keep the accumulation of soot at a minimum.

Building chimneys with bricks set on edge is dangerous as it makes thin, unstable construction that soon causes the cracking of the mortar and the development of crevices between the bricks. It is considered imperative that the bricks should be laid flatwise. The practice of building woodwork into a chimney wall should never be permitted, nor should it touch the chimney, a separation of approximately 2 in. being necessary for safety. This applies to all floor construction, partitions, rafters, roof boards and shingles.

Where a chimney passes through a floor, the space between the floor timbers and the chimney should be filled with some porous, incombustible material, such as cinders, refuse plaster or mortar, held in place by a sheet of metal nailed to the underside of the wooden beams. Neither solid mortar nor brickwork should be used to fill the space, since they will transmit heat. Gypsum blocks sawed to fit the space constitute one of the best materials for this purpose. At the roofline sheet metal flashing, set into the joints of the brickwork and overlapping the roof boards, should be used.

AN IMPORTANT PRECAUTION.

It may be mentioned that filling the space between the chimney and the woodwork has two important results. In the first place it prevents a fire, originating on a lower floor, from passing up behind a partition or furring into upper stories or the attic, and also avoids the possibility of rats or mice building nests in these spaces and thus filling them with highly combustible material, which in time may be ignited from heat transmitted through the chimney wall. Woodwork frequently catches fire in this way.

It is stated in the model ordinance that a round flue will give a better draft than a square or rectangular shape having the same cross-sectional area, and it advocates using the round kind when practicable. When such flues are placed inside rectangular chimney walls, however, care must be exercised to fill completely the corner spaces. Otherwise there is likely to be a leakage of air which would detract from the draft, and also increase the fire hazard.

METHOD OF TESTING CHIMNEY.

It is advised that chimneys, both new and old, be tested by building a smudge fire at the bottom of the flue and, while the smoke is flowing freely, closing the flue at the top. The escape of smoke into other flues or through the chimney walls will indicate openings that should be closed up.

If a chimney becomes too hot to touch with the hand, without discomfort, it may be considered dangerous if any woodwork is in contact with it.

It is necessary for the safe and efficient operation of heating apparatus that the smoke-pipe and flue should be free from soot. Bituminous coal is

particularly prolific in causing soot to accumulate and where it is used frequent cleanings are necessary.

An accumulation of soot in the flue makes a chimney fire probable and in that event sparks are fairly certain to fall upon the roof or to escape through cracks in the chimney walls. There was a case in a western State where a chimney blaze resulted in what the firemen described as "balls of fire" being thrown into the air. There was such an outpouring that the firemen had their hands full to prevent development of a conflagration, in the neighboring buildings being roofed with wooden shingles.

The soot hazard is a serious one and constitutes a good reason why chimneys should never be burned out to clean them. Last winter a Nebraska high school building was damaged to the extent of $20,000 by a fire due to the over-heating of a metal smokepipe while the soot was being burned out. The practice is likely, also, to crack the flue lining.

GOOD HEALTH WEEK, OCTOBER 23-30, 1922

Good Health Week is to be observed on a national scale, October 23-30 next. Everything that pertains to better sanitation and a more healthful environment and which may be popularized by the words, ventilation, sanitation and personal hygiene, will be featured during that week on a scale never before attempted. Heating and ventilation, naturally, will come in for a prominent place in the campaign and both manufacturers and dealers are fully alive to the possibilities of bringing home to the public in a new and forceful way the advantages, as well as the best practice, in the supply of fresh air.

Started at the instance of the Ilg Electric Ventilating Co., of Chicago, the movement has rapidly gathered impetus. During the past month, for instance, a number of manufacturers have been using the seal on their letters and other mail matter bearing the slogan "Good Health Week, Oct. 23-30, 1922."

At the same time a committee headed by G. O. Breidert, general production manager of the Ilg Electric Ventilating Company, has been formed to further the movement. The other members of the committee are William F. Hatch, of the Palmolive Company; William F. Woolley, manager of the National Trade Extension Bureau; Dr. J. G. Lepp, of the Modern Hospital Publishing Company; Charles G. Parks, of the American Linen Supply Association; William A. Biddle, of the American Laundry Machine Company; and Dr. J .N. Hurty, commissioner of health for the State of Indiana.

Under the general slogan of "Good Health Week," the part played by good ventilation will be featured on the basis that "the air we breathe should be as pure as the water we drink." Under this heading will be taken up the ventilation of homes, especially kitchens; the attractiveness of well-ventilated stores, the importance of adequate ventilation for churches, theatres, lodge or assembly halls the increased activities of office help in well-ventilated offices, the advantages of furnishing fresh air in restaurants and cafés and other similar places where odors are apt to be found. Finally, the life force of ventilation in factories will be emphasized, not only for removing fumes, vapor, smoke, steam, acids, etc., and for drying and cooling, but also to maintain healthful air conditions and consequently a larger output.

GOOD HEALTH WEEK ENDORSED BY SECRETARY OF LABOR DAVIS.

Enthusiastic endorsement of "Good Health Week" has been given by Secretary James J. Davis, of the Department of Labor, who states in a letter to Secretary-Treasurer William F. Hatch of the Good Health Week Promotion Bureau:

"I have just read an outline of the work which is to be undertaken by the Good Health Week Promotion Bureau during the week of October 23 to 30, and it affords me pleasure to heartily endorse the bureau's efforts.

"Any organization movement for better health should have the support of every man, woman and child in America. It is a duty we all owe to ourselves, our neighbors and our nation. Healthy families are usually happy families, and it is up to each one of us to contribute our assistance in that direction.

"The medical profession has enough to do in bringing back health to the sick; the laymen can himself prevent most of his ills and he should do his part. If there is any way, personally or officially, that I can help out in an educational campaign to create more widespread interest in personal hygiene, sanitation and ventilation in the home or in industry, thus giving to us a state of better health, my services are at your command."

The full personnel of the Good Health Week Promotion Bureau is as follows: Chairman, G. C. Breidert, Ilg Electric Ventilating Company; William F. Heissenbuttel, past president of the Linen Supply Association of America; William J. Woolley, secretary-manager of the National Trade Extension Bureau; William H. Biddle, of the American Laundry Machinery Company; A. T. McCormick, M. D., State Health Commissioner of Kentucky; and William F. Hatch, of the Palmolive Company.

COUNTRY-WIDE CAMPAIGN PLANNED.

An idea of the extent of the campaign can be gained from the statement that in addition to the co-operation of newspapers, magazines and trade journals, women's clubs and school officials throughout the country are co-operating to impress the basic truths upon the minds of children.

Every firm, industry or association has letters, circulars, invoices, etc., going through the mail daily. Special stickers have been for use on such stationery, following the design shown in the accompanying illustration. These will be furnished at a nominal cost. Electrotypes of the seal will also be furnished practically at cost. For every $2.50 subscribed to the campaign 1000 seals will be furnished the subscriber. Additional seals may be purchased at 50 cents per 1000 by subscribers and $1.00 per 1000 by non-subscribers.

PLANS FOR LOCAL CO-OPERATION.

Supplementing the general campaign, local lectures are being planned, as well as proclamations to be issued by governors, mayors, etc. Local clubs such as the Rotary, Kiwanis and Civic, Chamber of Commerce, etc., will be urged to have addresses made before their members on the possibilities of Good Health Week as a public benefit. The Public Good Health Week Executive Committee is prepared to furnish good health articles on the subject of ventilation, sanitation and personal hygiene which may be published in local newspapers. Eminent physicians and health authorities will also write articles on the subject which will be released in national mediums, as well as through the newspaper syndicates.

A very complete idea of the Good Health week campaign is given in a circular issued by the bureau on "Telling the Nation." This circular, as well as any other information on the subject, may be obtained from the Good Health Week Promotion Bureau, Room 704, 209 Grand Avenue, Milwaukee, Wis.

Advocates Pea Coal for Heating Boilers.

Referring to the fuel situation and the alternatives that are being faced in the use of fuels, the Titusville Iron Works Company states that it has been the company's recommendation for some time back to burn anthracite pea coal in house-heating boilers. This does not, of course, refer to the small boilers for residences, the company's line including only those of the larger types, suitable for installation in apartment houses, hotels, loft buildings, etc. For this class of work the company's boilers are made in capacities ranging from 3000 sq.ft up to 28,000 sq.ft. of radiation. On the large units where there is sufficient draft, the use of buckwheat coal is recommended.

"Although we build all types of downdraft boilers for bituminous coal," states M. A. Cordner, the company's New York sales manager, "we always arrange them so that either anthracite or bituminous coal can be used."

NATIONAL TRADE EXTENSION BUREAU

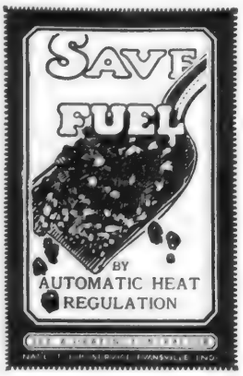
Successful Methods for a Heat-Regulation Campaign.

By a singular coincidence the selection of September, made long ago by the National Trade Extension Bureau, as a time for a campaign on automatic heat regulation, comes at probably the most critical period of the coal situation. As it turned out, a better month could not have been selected for the sale of heat-regulating and other fuel-saving appliances.

In order to take full advantage of the situation that has been created, the bureau urges a careful planning of every step in the heat regulation campaign by every individual interested. His first move, states the bureau, should be the compiling of an accurate list of prospects. This can be done from the telephone book, or by a house-to-house visit made by school boys. Through such a house-to-house canvass, it is pointed out, it is possible to ascertain the kind of heat in every business building or residence visited, who the owners are, whether there is any form of mechanical regulation, etc.

The next step suggested is the compilation of a series of sales letters covering the heat regulator or other heating appliances. At least three such letters should be sent to every prospect, each letter differing in its appeal or selling points. Any special requests for such letters will be promptly filled when sent to T. E. B. Sales-Help Service, at Evansville, Ind.

During the week outlined for the grand finale of the campaign, and at least during the week preceding it, newspaper advertising is recommended, while, during the final week of the campaign, the dealer should employ some person to follow up all replies or live prospects. Even a house-to-house campaign is recommended.



AUTOMATIC HEAT REGULATION CAMPAIGN STICKER.

Where the buyer desires to purchase a heat regulator on time payments, a contract form is suggested by the bureau, allowing for interest at the rate of 8%.

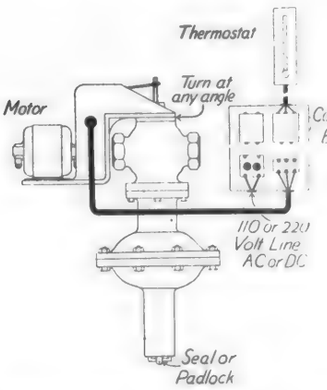
Stickers like that reproduced herewith are being furnished by the National Trade Extension Bureau to further the Automatic Heat Regulation Campaign. They are obtainable in 1000 lots only at 50 cents per 1000.

TYPICAL ADVERTISEMENTS FOR USE IN CONNECTION WITH HEAT REGULATION CAMPAIGN.

Controlling the Steam Delivery from a Central Heating Plant.

Anything that will help the consumer of heat to reduce his bills during the coming winter is of exceptional interest just now, not only to him but to central heating companies generally because, as was brought very clearly at the recent convention of the National District Heating Association, the lowered operating costs are bound to result in a clamor for lower heating rates unless the utilities can keep the consumers' bills down.

Among the appliances for this purpose which have developed along with the development of central station heating are the Hornung pressure and temperature-control valves. The successful use of these valves has made them well known in the district heating field. In their latest



HORNUNG PRESSURE AND TEMPERATURE CONTROL VALVE AS ARRANGED FOR MASTER CONTROL.

design, however, there has been added the feature of a motor-driven temperature control, or master control, as it is termed.

The master control feature makes the valve a combination of two valves in one, as the lower diaphragm operates to control the pressures, while the motor mounted on top of the valve operates to close off the steam when no heat is required in the building. As will be noted from the accompanying illustration, the electrical connection to the motor is run from an automatic control box which contains the automatic switch, together with the required fuse, hand switch, etc. The thermostat operating the electric control may be either of the wall type or of the immersion type.

According to tests reported by the manufacturer, J. C. Hornung, 343 South Dearborn Street, Chicago, the consumption of steam as supplied by the central stations and as measured by the meter, has been reduced 30% on the average.

Recent circular matter describes the Hornung pressure valve which is furnished with either rubber or metal diaphragm; the pressure and temperature control valve, also furnished with either metal or rubber diaphragm; and the temperature control valve. All valves as listed are furnished for inlet pressures up to

100 lbs. and for outlet pressures adjustable from 6 oz. to 4 lbs.

The thermostats used with these valves are furnished by the manufacturer in either the plain type or the 8-day clock type.

A Classic Example of Fuel Saving with Recirculated Air.

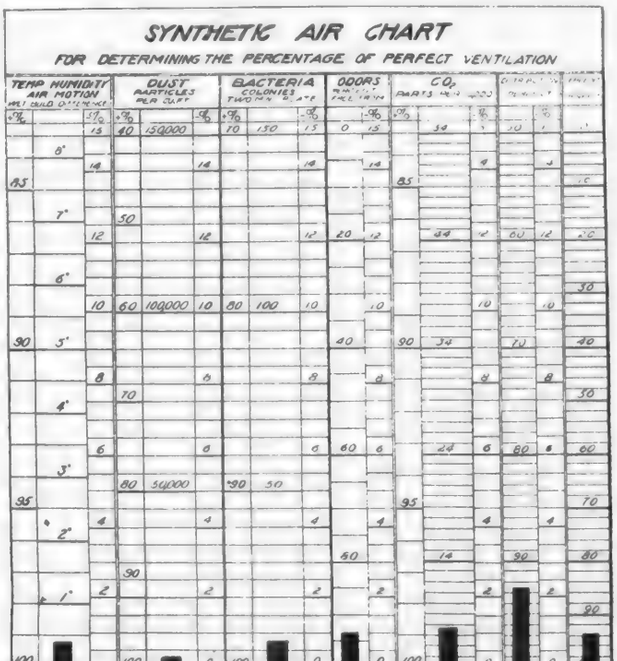
One of the most remarkable examples of fuel saving in the heating and ventilation of a school building is that reported by the Rezin Orr School, in Chicago. In a test at this building, the results of which are shown in the accompanying illustration, the air was recirculated and was supplied with ozone, through an Ozone Pure-airifier As compared with fifteen or twenty other school buildings, in which the air was recirculated without the use of ozone, the Rezin Orr School reported the highest percentage of perfect ventilations, and in addition, showed a saving of 5% in fuel.

The manufacturers of this ozone machine, the Ozone Purifier Company, of Chicago, states that the same satisfactory results as regards the character of the air supply and the saving in fuel have been obtained at the Douglas (colored) School, Chicago which is attended by 1800 colored pupils.

In recirculating the air with one of these ozone units the practice is recommended of reducing the amount of outside air to approximately 15% of the total air that is circulated through the rooms. What this means in a typical building heated entirely by warm air delivered by fans and heated by tempering and reheating coils may be judged when it is stated that a final temperature of 135°F. is necessary at the fan outlets to produce a temperature of 70° in the rooms.

If the outside air is at zero and all the air is taken from the outside, the air will have to be raised 135° in temperature. If, however, the air of the rooms is recirculated and only 15% of the outside air introduced then 85% of the air will have to be raised from only 65° (the temperature of the air leaving the rooms) to 135°, or but 70°. Therefore, if 85% of the air is raised 70° and 15% is raised 135°, the average rise is only 80°, or a saving of 45%. It is easy to figure the saving in fuel that will be brought about by this reduction of air heating.

In what is termed the "split system," in which enough direct radiation is installed in the rooms to take care of the wall and glass losses, the air is delivered to the rooms at about 80°. As the *re-circulated* air in this case would only have to be raised 10° the saving as far as the air change loss is concerned is 75%.



RECORD OF AIR TEST IN ROZIN ORR SCHOOL, CHICAGO.

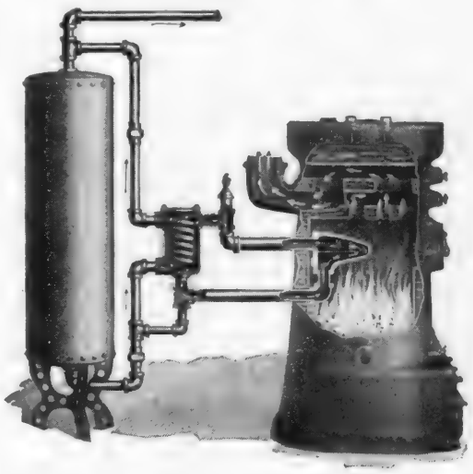
The fuel required for the direct radiation is constant, but as the indirect radiation averages about 65% of the total equivalent direct radiation installed, the overall saving in this case at zero outside temperature would be approximately 49%.

In figuring the consumption of electric current, it has been found that an installation supplying 25,000 cu. ft. of air per minute can be operated on alternating current for about 12 cents a 10-hour day, with current figured at 10 cents per kilowatt.

Overcoming Lime Deposits in Hot Water.

Many localities throughout the country, as is well known, are troubled to a considerable extent with lime deposits in the water. When this water is heated to a temperature above 160° F., the formation of lime deposits is very rapid and increases as the temperature approaches the boiling point. Where such lime deposits occur, it is almost impossible to use copper-coil gas water heaters due to the fact that they become clogged so quickly. Instead it is customary to use a cast-iron heating element as a rule.

An arrangement intended to reduce to a minimum or eliminate entirely the deposits of lime in heated water has been



DESIGN OF EXCELSO WATER HEATER TO OVERCOME LIME-DEPOSITS IN HOT WATER.

developed by the Excelso Specialty Works, Buffalo, N. Y., manufacturer of the Excelso water heater. The arrangement comprises a combination of the firepot generator and an Excelso copper coil indirect water heater. Not only is this combination suitable for use with a firepot generator, states the manufacturer, but it permits the use of a copper coil gas water heater which may be used in place of the fire-pot generator and connected up in identically the same way. It is also entirely practical to connect the copper coil gas heater as a third member of the combination so that in winter it would be possible to use the firepot generator and in summer the copper coil gas water heater. Patents on this combination have been applied for.

Boilers Should Burn Any Kind of Coal or Oil.

A noteworthy stand on the requirements that should be met by a modern house-heating boiler is taken by the Abram Cox Stove Co., of Philadelphia, Pa., manufacturer of the Novelty line of boilers, including the Novelty Carburetor boiler. "Our recommendations to a prospective purchaser," writes E. F. Glore, general sales manager for the company, "would be to purchase a boiler in which he can burn any kind and size of hard coal or soft coal, without smoke, or oil. The manufacturers of boilers should be made to state specially the kind of coal their

boilers will burn. For instance, we would not recommend our regular surface-burning boiler above 2600 sq.ft. of steam radiation in the City of Chicago because we know that the smoke department of that city would not give a permit for its use, as all boilers above that capacity in the City of Chicago must be fitted with some smoke-consuming device.

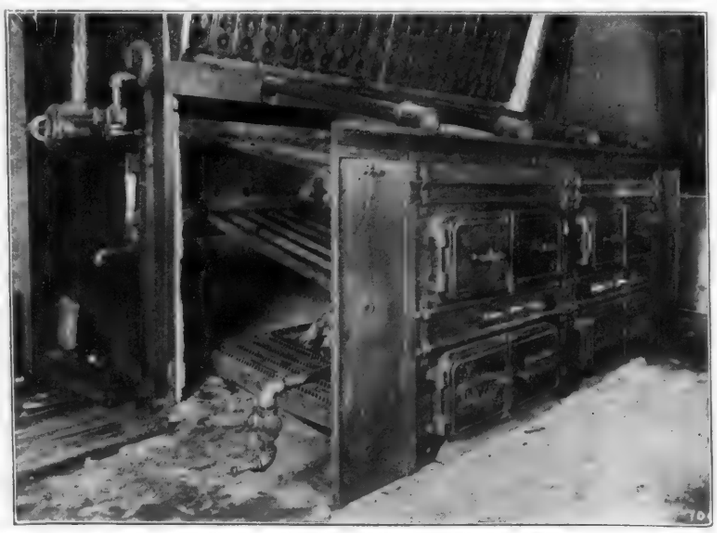
"This is true of a number of other cities. But there is absolutely no reason why a purchaser in one of the Eastern cities cannot use soft coal which, of course, is much cheaper without being a nuisance, provided he purchase a smokeless boiler. And most of the boiler manufacturers have one.

"This is the information which the architects, builders and owners are looking for and have been advised about very little except in the advertisements of the manufacturers of boilers.

"We might say that in many of our Carburetor boilers the owners are burning oil. This oil is so smoky that unless a smoke-consuming device is used, they cannot burn the cheaper oils."

When It Pays to Burn Refuse in Heating Boilers.

The fact that some important concerns take great care to recover the heat from their refuse is shown in the many notable installations for this purpose. The accompanying illustration, for instance, shows a 400-H.P. water-tube boiler under construction in the department store of Rothschild & Co., Chicago, Ill. This boiler is equipped with a Chicago Hawley down-draft furnace which is specially-designed for burning waste paper, shavings, excelsior, broken boxes and refuse of all sorts. The lower fire doors, it will be noticed are made extra large and the lower grate bars are only a little above the floor line. With this arrangement waste paper can be dumped on the floor and pushed in on the lower grates where it is consumed without smoke. The heat is used to generate steam at a saving which may run as high as 70% to 75% when burning the refuse. At the same time, a banked coalfire may be carried on the water-tube grate above which makes it possible to pick up the load with the banked coal fire when the refuse gives out.



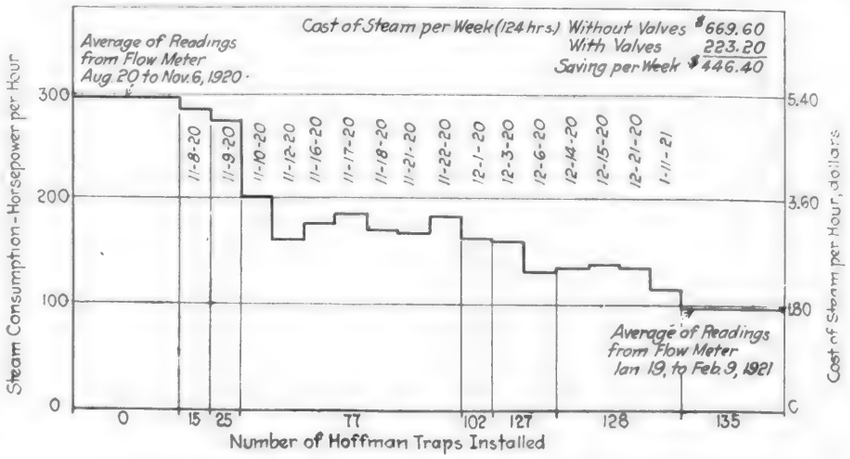
400-H. P. WATER-TUBE BOILER IN ROTHSCHILD & COMPANY'S DEPARTMENT STORE, CHICAGO, EQUIPPED WITH CHICAGO HAWLEY DOWN-DRAFT FURNACE FOR BURNING REFUSE.

In commenting on this practice, President John W. McNeal, of the Chicago Down Draft Furnace Company, states that Montgomery Ward & Company have used this system for burning their refuse for over twenty years in their Chicago plants and for seven years in their Kansas City, Mo., plant. The company has recently installed such a furnace in their St. Paul, Minn., plant. This type of furnace is also installed in a number of chair and furniture factories for burning shavings and wood refuse.

Remarkable Savings Effected by Steam Traps.

A remarkable case of steam saving through the installation of steam traps is reported by the Hoffman Specialty Co., Waterbury, Conn. In the mold room of the Mechanical Rubber Company, in Cleveland, O., there are 135 presses which require nearly 300 B. H. P. per hour. In an effort to reduce the steam consumption each press was equipped with a Hoffman steam trap.

A glance at the accompanying chart will show the results secure. The steam consumption was reduced to approximately 100 B. H. P. The chart shows that



SAVINGS OBTAINED BY USE OF STEAM TRAPS IN MOLD ROOM OF MECHANICAL RUBBER COMPANY.

the economies increased with the number of traps. The ups and downs of the chart, such as are indicated under the date of 11/17/20 and 11/22/20 are due to the fact that a large number of presses were in service.

The presses used from 35 to 75 lbs. of steam pressure, depending upon the nature of the work being put through and it is stated that the Hoffman traps operated under the pressure variation without changes or adjustments of any sort. The company also states that the same types of valves as are installed in this particular factory are used in low-pressure or vapor-vacuum heating work without adjustment of any sort.

RELATIVE EFFICIENCY OF INDIVIDUAL TRAPS VERSUS ONE LARGE TRAP.

In some additional tests reported by W. K. Simpson, secretary of the Hoffman Specialty Company, an effort was made to determine the relative efficiency of individual traps versus one trap for draining a battery of coils. The investigation covered a period of three months and it was found that there was an increase in kiln capacity (the coils being used in dry kilns) of 31.7% when individual traps were used on each unit, in comparison with the use of a single trap draining the entire kiln.

Conditions at the plant of the Mechanical Rubber Company were somewhat similar, so that a portion of the saving which resulted from the use of Hoffman valves is attributable to the better control when a single trap was used on each press.

West Englewood, N. J.—A plan for the extension and development of the Roosevelt Military Academy, in West Engelwood, N. J., has been made by William H. Gompert, a New York architect. It is proposed to provide accommodations for 500 cadets in modern and fireproof buildings on a site of 23 acres owned by the academy. This will be five times the present capacity.

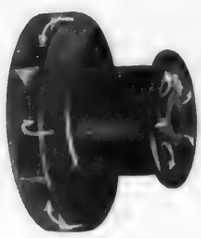
PORTABLE UNIT FAN BLAST HEATERS

IV—The Bayley Thermo-Unit

In the Bayley Thermo Unit, which is designed for industrial work only, the manufacturers have produced a self-contained heating and ventilating plant which, it is stated, will operate with a greater efficiency than a direct heating system, when air from inside is recirculated, and with equal efficiency when all or part of the air is taken from outside of the room.

It is described as a complete indirect heating system, with a heating surface consisting of individual spiral radiators, so valved, if desired, that one or more of the coils may be cut out as temperature variations demand. The fan takes the air from the floor line, forces it through the heating coils into the room at about 6 ft. above the floor. The air as it cools returns to the coils, thus forming a continuous cycle as long as heating is required. If desired, all or part of the air can be taken from outdoors, thus combining ventilation with indirect heating.

FIG. 1.—BAYLEY THERMO-UNIT



SPECIAL VENTILATED PULLEY WHEN USING BELT DRIVE.

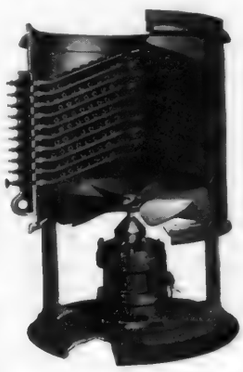


FIG. 2.—INDIVIDUAL VALVE CONTROL FOR EACH COIL SECTION

These units are designed for use with either high or low-pressure steam. Being motor-driven they do not depend upon line shafts or belting. The manufacturers point out that the units can be placed on the floor, gallery, or outside the building; they require no special foundation. The motor for driving the fan is fully enclosed, dust-proof and equipped with ball bearings. Only two piping connections are required, the steam line and the condensation return line.

The accompanying illustrations show the different outlet connections for distributing tempered air to the greatest advantage, regardless of the location of the Thermo-Unit. The first illustration at the left in Fig. 3 shows a four-way breeching for use in center installations, distributing in four directions. The center illustration in Fig. 3 shows what is termed the universal breeching for distributing tempered air outward and downward in all directions. The right-hand illustration shows a two-way breeching for installing the Thermo-Unit against a wall, distributing in two directions.

The Bayley Thermo-Unit or "B. T. U." as it has been aptly named by the manufacturers, is ordinarily built with the fan beneath the coils. It is, however, possible to place the fan above the coils blowing down, or blowing upward and drawing air through the coils. This last arrangement is not recommended unless building conditions make it absolutely necessary as in that case the fan will be handling hot air.

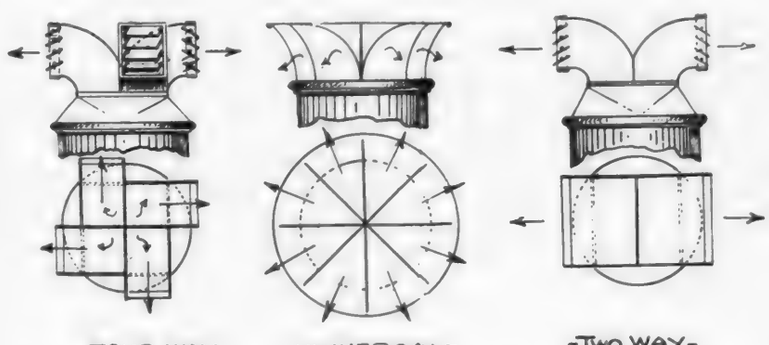


FIG. 3.—DIFFERENT OUTLET CONNECTIONS FOR USE WITH BAYLEY THERMO UNITS.

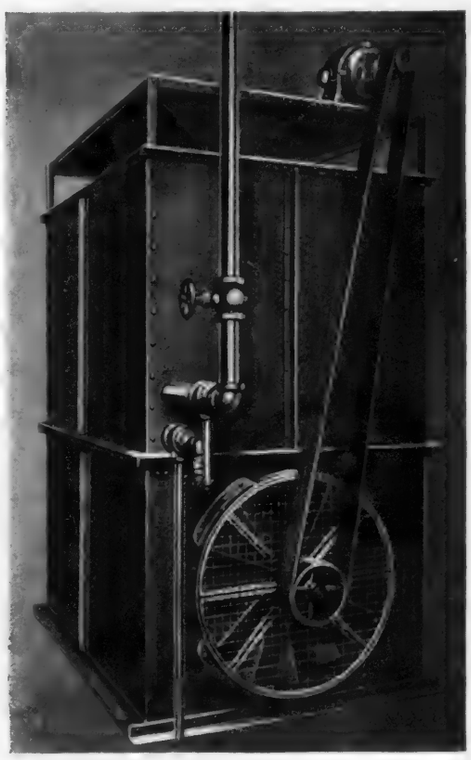
Where it is desired to operate the Thermo-Unit from a pulley the manufacturers are prepared to furnish a belt-driven type, this unit being equipped with a specially-ventilated pulley, which operates on the principle shown by the arrows in Fig. 4. As the pulley speeds up, the air is drawn through the pulley and its tractive surface is thus kept cool, so that the slippage caused by variations in the speed of the fan will not cause the belt to overheat or burn.

SIZES AND APPROXIMATE DIMENSIONS OF BAYLEY THERMO-UNITS.

No.	Diameter in Inches.	Approximate height in Inches.
24	24	53½
30	30	56½
36	36	59
42	42	63
48	48	69
60	60	75

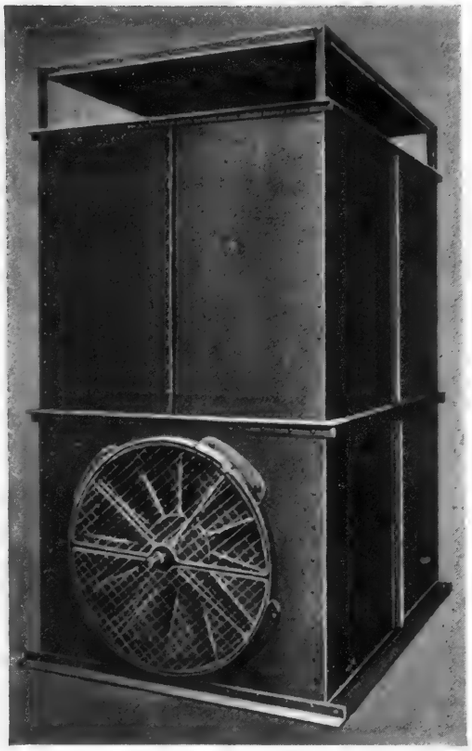
V—"ABC" Portable Heating Units.

In the latest types of "ABC" portable heating units, made by the American Blower Co., Detroit, Mich., the design has been developed considerably. As now made each unit consists of a fan chamber below the coils, one or two fans according to size and design, a heater of ¾-in. pipe coils set staggered and bent cold in one continuous pipe between cast-iron steam and return headers. All of these parts are enclosed from the floor to the air outlets in heavy sheet-iron casings attached to a substantial structural frame and made easily removable for access to the heater.



FRONT VIEW, ABC PORTABLE HEATING UNIT.

The corner angles support an inverted cone top designed to give proper direction to the flow of warm air being discharged into the room. The heater coils are made



REAR VIEW, ABC PORTABLE HEATING UNIT.

CAPACITY TABLES FOR "ABC" PORTABLE HEATING UNITS.

CLASS 1.—FLOOR TYPE.

Size	Capacity, Cu. Ft.	Capacity B.T.U. per Hr.	H.P.
7½ D	7500	450,000 to 675,000	1½
10 D	10000	600,000 to 900,000	2
15 D	15000	900,000 to 1,350,000	3

CLASS 2.—TYPE FOR PLATFORM MOUNTING OR CEILING SUSPENSION.

5 V	5000	250,000 to 325,000	¾
7½ V	7500	375.000 to 487,50	1
8½ V	8500	400,000 to 535,000	1½
10 V	10000	500,000 to 650,000	1½

of especially treated ¾-in. pipe, bent to a form which allows for drainage of condensation and for expansion and contraction. The pipes are screwed into the cast-iron manifolds, the two rows being staggered for more effective heating.

Tappings in the end of each cast-iron manifold provide for a single 3-in. supply and a single 2-in. drip connection.

Care has been taken to keep the resistance low through the unit, permitting the passage of air with a minimum power requirement. In fact it is possible sometimes for long periods to heat satisfactorily without operating the fans.

Exhaust steam or live steam up to 100 lbs. pressure may be used, the heating effect increasing with the higher steam pressures in proportion to the difference between the temperature of the steam and the temperature of the entering air.

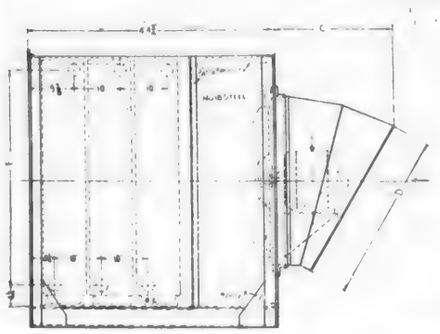
The motor for operating the fans may be located separately from the heater or attached to the heater by structural supports if desired.

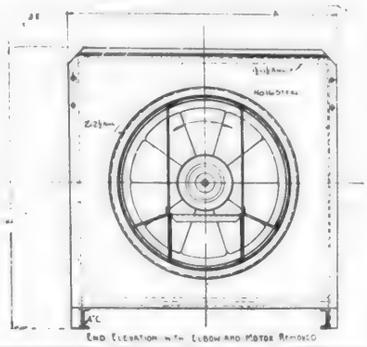
The standard outlet is the apron type, as illustrated. A closed top with outlet elbows for discharging the air in one or more directions is also furnished.

"ABC" portable heating units, it is stated, are particularly adapted to the heating of factories, machine shops, foundries, garages, paper mills, textile mills, woodworking shops, warehouses and industrial buildings generally.

To meet conditions where it is desired to use heaters suspended from the roof trusses or supported on platforms from the floor, the company makes units for such mounting. This type of heater, it is pointed out, must be located so as to cause the heated air to flow to the floor level. For this reason it is desirable that the heaters be installed not more than 12 ft. above the floor and used only when the conditions are favorable. The equipment for this type includes cast-iron radiators and a Ventura motor propeller fan. The air is drawn at low velocity over the radiators and discharged toward the floor, through the outlet elbow.

GENERAL DATA FOR "ABC" PORTABLE HEATING UNITS, PLATFORM MOUNTING OR CEILING SUSPENSION TYPE. GENERAL DIMENSIONS IN INCHES.





Unit No.	Fan Size	Regular Vento No. Stacks	Regular Vento Size	Square Feet Heating Surface	H. P.	R. P. M.	Shaft Exten.	A	B	C	D	F
5-V	5	3	8-40	258	¾	870	3½	47½	49	20½	28	36¼
7½-V 8½-V	6	3	10-50	405	1 1½	750 850	4	57½	59	27½	36	46¼
10-V	7	3	13-50	526½	1½	670	4	72½	59	29½	42	46¼

GENERAL DATA FOR "ABC" PORTABLE HEATING UNITS, FLOOR TYPE GENERAL DIMENSIONS IN INCHES.

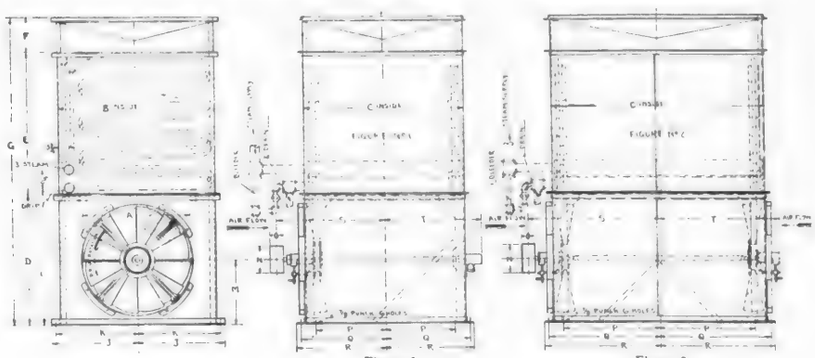


Figure 1 Figure 2

Size	Figure	A	B	C	D	E	F	G	J	K
7½D	1	36	53	30	48	48	12	108	29⅞	28¼
10D	1	42	53	54	48	48	12	108	29⅞	28¼
15D	2	36	53	74	48	48	12	108	29⅞	28¼

Size	Figure	L	M	N	O	P	Q	R	S	T
7½D	1	50	24	10	43¼	16	193¼	21⅞	27	24
10D	1	50	24	12	53¼	24	283¼	30⅞	36¼	32½
15D	2	50	24	10	43¼	32	383¼	39⅞	44½	41½

CEILING OR PLATFORM TYPE OF "ABC" PORTABLE HEATING UNIT.

New Apparatus and Appliances

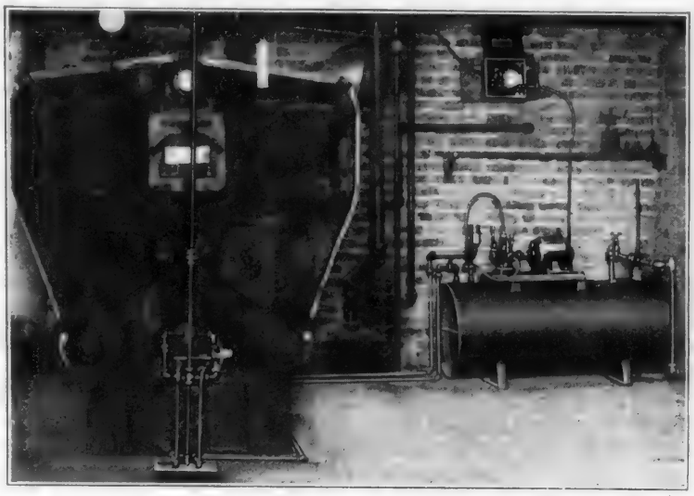
Combustion Fuel-Oil Burners.

A fuel-oil burning outfit for house heating, which has attracted attention, especially in the middle West, has been developed by the Combustion Company, 4256 North Western Ave., Chicago, Ill. The accompanying views show the principal details of the apparatus. It consists of five elements: the air jet nozzle, pilot light, motor-driven air pump, automatic thermostatic control and fuel tanks. The air jet nozzle is a burner and fires directly into the fire-pot through the refractory door by spraying the fuel-oil into the flame of the pilot light. The refractory door is put on in place of the standard furnace door and is the only change made in the furnace.

Special care has been taken in the design of the motor-driven air pump to obtain a uniform supply of air and oil. An air pressure of 3 lbs., it has been found, is sufficient to atomize the oil and furnish it with oxygen for initial combustion. The air pump also forces the oil from the service tank to the nozzle. The electric power required, it is stated, is slight as the motor runs only when the heat supply is being increased.

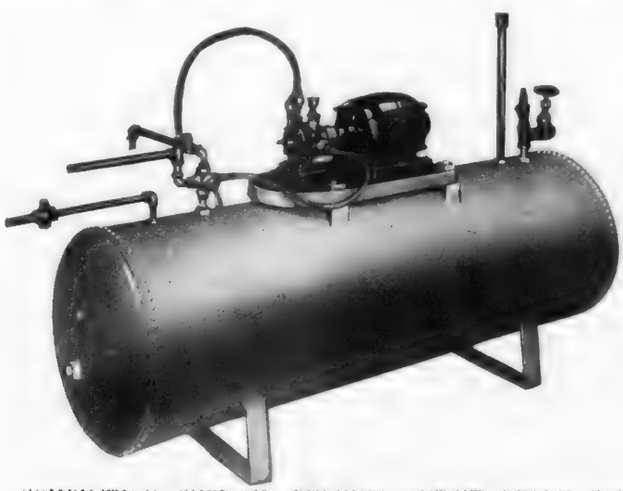
The automatic thermostatic control used with these burners has some unique features. It consists of three elements, all interlocked and operating to start and stop the motor as required. The room thermostat may be set to any desired temperature and this starts or stops the machine in accordance with temperature changes. The boiler thermostat is designed to stop the machine in case the water temperature or the steam pressure exceeds a predetermined point. Finally, the pilot thermostat is intended to stop the machine in case the pilot light should be extinguished. The burner is designed so as to prevent oil from being sprayed into the furnace unless the pilot light is burning.

A fuel-oil storage tank of at least 1000 gal. is recommended so that advantage may be taken of seasonal low prices of oil and to permit the delivery of oil by standard 1000-gal. tank trucks. Sixty-gallon steel service tanks are recommended inside either above the floor or cemented in underneath the floor.



TYPICAL INSTALLATION OF COMBUSTION FUEL-OIL BURNING SYSTEM.

Combustion fuel-oil burners are regularly built in ten sizes. The smallest size is intended for capacities up to 750 sq. ft. of actual connected steam radiation, or for the average seven or eight-room house.



COMBUSTION FUEL-OIL BURNING OUTFIT READY FOR INSTALLATION.

The next larger size has a capacity up to 2500 sq. ft. of steam radiation, suitable for large buildings and factories within its capacity. Size No. 3 has a capacity up to 6000 sq. ft. of steam radiation.

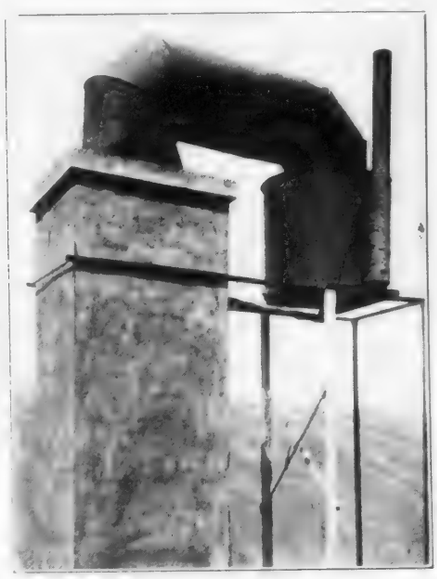
Combustion burners are also available for high-pressure boilers. For high-pressure work, steam, instead of air, may be used as an atomizing agent. In that case only oil pumps are required.

New Type of Draft Regulator.

An Oregon miner has invented a draft regulator which is reported by those who have tried it to save from 10% to 60% of the fuel and to possess other advantages which equal the fuel saving. These include greater heating efficiency, lengthening the life of the heating plant, less labor in caring for the furnace, less smoke and no sparks. Eighteen prominent users, including banks, stores, office buildings, hotels, apartment houses, residences, bakeries and manufacturing establishments report an average fuel saving, with its use, of 33%.

The device was invented to save values in a mercury mine near Yoncalla, Oregon, where the percentage of mercury recovered from the ore was increased by the use of the regulator from 66% to 99%. Noting the great saving in fuel, J. O. Anderson, the inventor, adapted the regulator to heating plants. It is now in use on between 30 and 40 buildings, mostly in Eugene, Ore., and Greenville, S. C. Successful installations have also been made in Portland, Tacoma, Seattle, Des Moines, Chicago, Charlotte and Raleigh, N. C. (Raleigh's new $1,000,000 hotel).

The regulator is adapted to steam and water heating plants and to plants using



NEW TYPE OF DRAFT REGULATOR, SHOWING STACK CONNECTED TO WATER TANK.

warm air heated by steam where the fuel is wood, coal, coke or briquettes. It has not yet been adapted to high-pressure power plants or to furnaces burning oil or gas.

The regulator consists of a return bend of pipe attached to the top of the smokestack and leading to an open tank containing water, which is raised or lowered to regulate the draft. The area of the tank is one-fourth larger than the end of the pipe, which points downward and ends at one-third the distance from the top of the tank. It has been found necessary to have the end of the pipe exactly level, so that all sides will touch the water simultaneously.

A small pipe runs from the bottom of the tank down to the furnace, where it is connected with water under pressure. One valve fills and another drains the tank. This pipe runs up inside the smokestack to prevent the contents from freezing, the portion running from the stack to the tank being covered with asbestos.

The height of the water in the tank is indicated by an electrically-operated gauge, which has a dial near the furnace and is connected with a float in a small tank near the large tank, the water being the same level in both vessels. When the hand points at zero the water is touching the end of the smoke pipe. When it is at figure 1 to the left the water is 1-in. below the end of the pipe. Figures to the right indicate the depth the pipe is submerged in water.

The regulator, it is stated, eliminates down draft through open-topped chimneys and provides for perfect draft control. By holding back the draft as desired a large percentage of carbon and combustible gases which usually escape are consumed.

New Line of Heating Boilers.

A new line of heating boilers, with some novel construction features, has been developed by the Advance Boiler Corporation, New York, and is now offered to the trade. Through the arrangement for admitting air into the secondary combustion chamber, these boilers are adapted for burning either anthracite or bituminous coal, placing them in line with the most recent advances in boiler design.

The air for internal combustion is admitted through the base on each side of the boiler. (See Fig. 1). Each port is sufficiently large to admit the required amount of air for initial combustion. Also the arrangement of the ports throughout the length of the base permits an even distribution of the air through the entire grate area, considered an important factor in securing proper combustion. The firebox has sufficient coal capacity for long firing periods and, owing to the numerous air inlets in the base, a rapid rate of combustion can be obtained if necessary.

The brick arch carrying the tubes is made of high-temperature refractory material. An arch is placed in each section in three parts, forming the arch, and the parts are locked together. This permits the arch to be easily put together or replaced after the boiler is entirely erected. In this way each section carries a complete arch with tubes, and when the boiler is set up these units form a continuous tube from the front to the rear of the boiler.

Air for secondary combustion is introduced through these tubes when burning bituminous coal or the lower grades of anthracite, such as No. 2 buckwheat. The air is preheated by passing across the smoke-box in the rear of the boiler before entering the combustion chamber, thus raising the temperature of the free oxygen, it is stated, to about 300° F. before it combines with the gases.

After the gases pass from the lower combustion chamber through the brick tubes where the preheated air is introduced, they pass up through the flues, as shown in Fig. 1. At this point a secondary combustion takes place by reason of the chemical combination formed.

The flues above the brick arch are so arranged that the one next to the gas passage on the side of the boiler is narrow and the area increases as the flues near the center; that is, the area of the center vertical flue is much greater than the one next to the return gas passage on the side of the boiler. This arrangement is made to insure an even distribution of the heat units throughout the entire section and to prevent any short-circuiting of gases. In the square sectional types of Abco boilers, 75% of the water heating surface is listed as direct, the only indirect surface being the gas travel passage toward the rear.

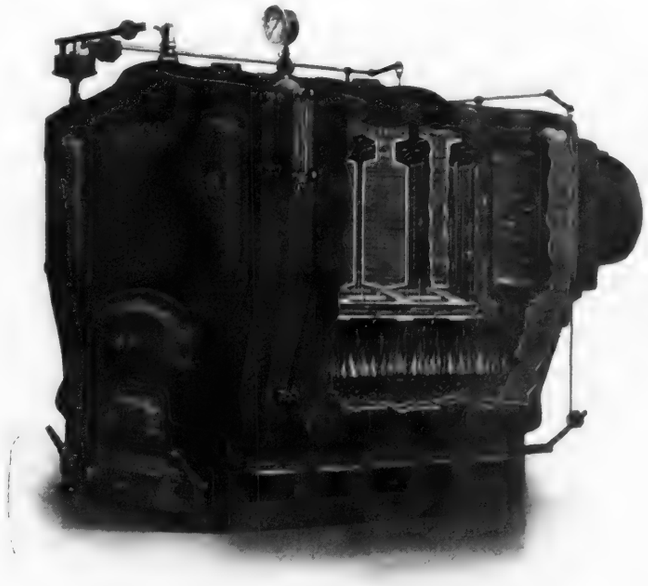


FIG. 1.—CONSTRUCTION OF ABCO SQUARE SECTIONAL HEATING BOILER.

At the top of the vertical flues a second crown sheet is placed directly under the water-line to insure a constant heat transmission throughout the entire travel of the water in the boiler. The importance of maintaining a steady water-line is recognized in providing for the water to pass to the top, giving off steam at that point and then passing to each side and returning down the side legs to be reheated.

The boiler is furnished with a Sylphon damper regulator acting on the damper in the smoke hood and connected to the side ports in the base. It can be set by means of an eccentric so as to open or close the damper and air inlets in base, as required.

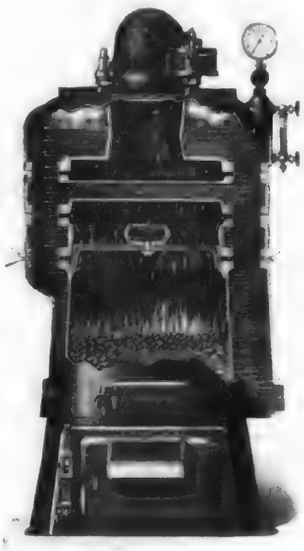


FIG. 2.—CONSTRUCTION OF ABCO ROUND SECTIONAL BOILER

Abco sectional boilers are of cast-iron slip nipple construction, made on special machines at the company's plant, and the sections are bolted together individually for easy setting up. The base is grooved to receive the sections. The water-column is cast directly on the front section, with a retard steam gauge.

These boilers are made in sizes to serve both small and large buildings, the steam radiation capacities running from 950 sq. ft. to 9050 sq. ft. and for water heating from 1550 sq. ft. to 15175 sq. ft. All of the ratings it is stated, are based on tests made according to the A. S. M. E. code.

The company in addition offers a line of round sectional boilers which are also fitted with the patented fire-brick arch. This type is notable for its large fire-pot section which permits it to hold coal for long firing periods. The same damper control is provided as for the square sectional type.

The factory of the Advance Boiler Corporation is located in Poughkeepsie, N. Y., with rail connections to three roads, as well as water connections. The building is of modern construction and especially designed for the manufacture of boilers. It has been equipped with new machinery for the manufacture of the Abco line. The company's main offices are at Grand Central Terminal, New York.

A New Development in Vacuum Pump Design.

The advent of a new vacuum pump on the market under the name of the Hydro-high vacuum pump, lends special interest to a description of its design which has been furnished to us by the inventor, E. Rosenhagen. "This new combined vacuum and boiler-feed pump," states Mr. Rosenhagen, "has features which should interest every architect, heating engineer and heating contractor. We have tried to make it as simple, positive and dependable as possible, as well as one economical to operate. As a matter of fact, we have found it to require about half the horsepower of the average vacuum pump. Unit C, for example, will handle 26,000 sq. ft. capacity on a 1 H. P. motor.

"There is no possible chance for the Hydro-high vacuum pump to become steam-bound," added Mr. Rosenhagen. "We have proven this by tests made under the most trying conditions."

The new pump is regulated by automatic float and vacuum controls. Because of the revolutionary changes in design, the inventor states that he can produce and maintain an exceptionally high vacuum.

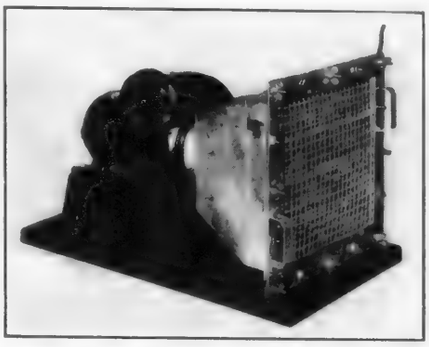
"Another interesting point in favor of our pump," said Mr. Rosenhagen, "is that there is no cold jet required to produce a high vacuum when handling high-temperature condensation. The Hydro is so designed that no delicate dual adjustments of the regulator controls are needed."

Unlike an ordinary centrifugal pump, the Hydro-high vacuum pump employs a two-opening suction inlet and an impeller of special design, embodying both the shrouded and the open type, all made of bronze.

The pump is now being manufactured on a commercial scale by the Hydro-High Vacuum Pump Co., Newport, Ky.

Air Cleaning Device and Ventilator.

A novel air cleansing and ventilating device has been developed by William M. Reed, Louisville, Ky., and is shown in the accompanying illustration. It consists of a fan mounted in the small end of a funnel-like pyramidal cone. In the large end



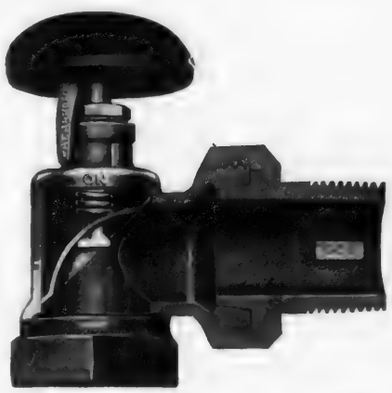
NEW AIR CLEANING DEVICE AND VENTILATOR

of this cone is mounted a screen frame, within which is contained a filling of air filtering material. Spaced horizontal partitions are arranged in this screen, and a quantity of absorbent cotton is placed on these several partitions. This cotton is saturated with oil. In fact, the main idea of the invention is the employment of oil to remove all dust and other foreign matter from the air, instead of water. If the air has been passed through an oil film, it is stated, there is no change in the humidity, as in the case of a water washer.

New Ideas Embodied in a Water Radiator Valve.

A new type of water radiator valve, working on the principle of a swinging plate, to eliminate as far as possible friction in hot water lines, has been developed by the Detroit Lubricator Co., Detroit, Mich., and is now being marketed under the name of the "Genuine Detroit" quick-opening water radiator valve. There has always been an objection to quick-opening water valves of the shell type, states the manufacturer, because they turn hard in service, due not only to the difficulty of manufacturing the cylindrical shell concentric with the bore of the body, but also to the gathering of incrustation between the shell and the body because of dirt, corrosion, etc.

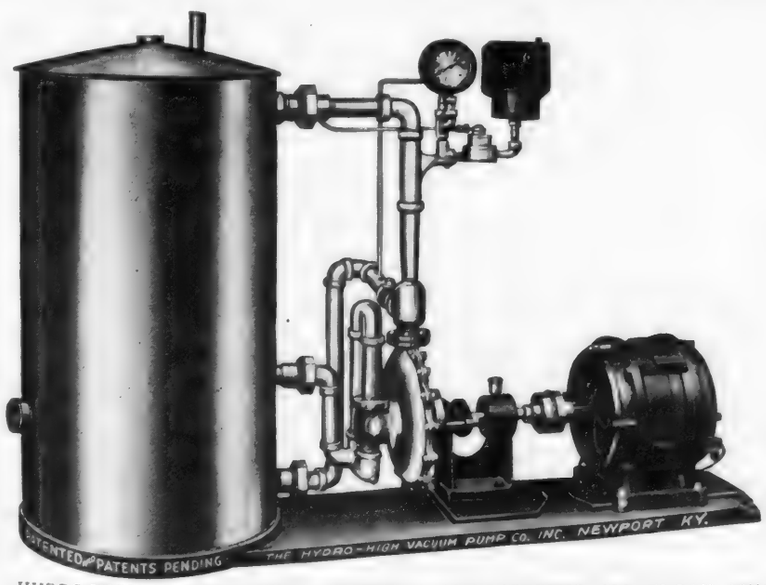
The new valve is designed to overcome these objections. It will be seen from the accompanying illustration, that an elliptical plate, set at a 45-degree angle, is attached to the stem. By revolving the stem one-half turn to the left the valve is opened, while one-half turn to the right closes it. Attached to the underside of



DESIGN OF DETROIT QUICK-OPENING RADIATOR VALVE.

the handle is an indicator which makes it possible to see at a glance whether the valve is opened or closed.

The narrow edge of the plate presents a small area of contact with the body, which simplifies the corrosion or incrustation problem. The sharp edge of the plate also acts as a scraper to clean the interior of the body of foreign matter. The valve is equipped with the new type of nonbreakable, non-heat-conducting round handle.



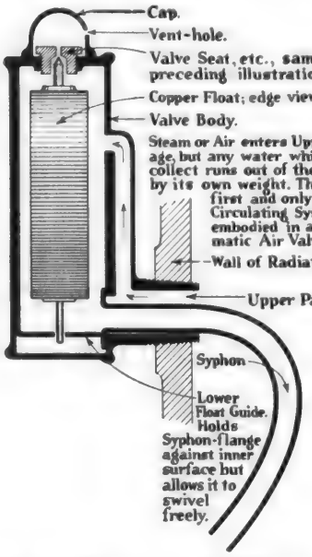
HYDRO-HIGH VACUUM PUMP SHOWING CONNECTIONS FOR FLOAT AND VACUUM CONTROLS.

INTERPRETATIONS OF THE BOILER CODE, supplementing the A. S. M. E. Boiler Code, has been issued as a separate publication by the American Society of Mechanical Engineers. It contains the complete set of interpretations from case No. 200 to date. Price $1.50 per set.

Thermc-Metal Principle Applied to a New Air Valve.

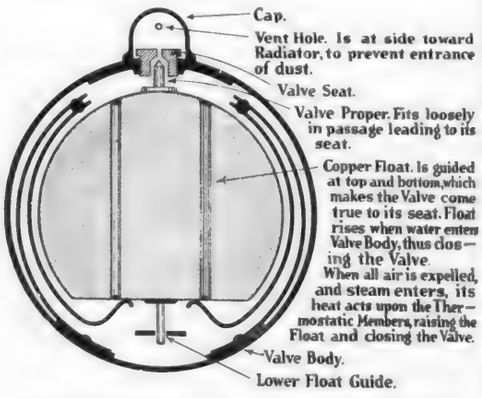
What is described as the first and only automatic air valve of the thermo-metal type has been developed by W. A. Russell & Co., Grand Central Terminal building, New York, manufacturers of the well-known Russell line of air valves and other heating specialties. The new product is known as the Russell perfect thermo-metal non-adjustable No. 7 air valve.

As will be seen from the accompanying illustrations, use has been made of


Cap.
Vent-hole.
Valve Seat, etc., same as in preceding illustration.
Copper Float; edge view.
Valve Body.
Steam or Air enters Upper Passage, but any water which may collect runs out of the Syphon by its own weight. This is the first and only perfect Circulating System ever embodied in an Automatic Air Valve
Wall of Radiator Loop.
Upper Passage.
Syphon
Lower Float Guide. Holds Syphon-flange against inner surface but allows it to swivel freely.

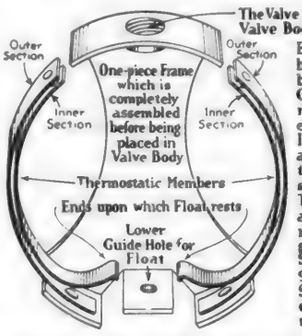
DIAGRAMMATIC SECTIONAL VIEW OF RUSSELL THERMO-METAL AIR VALVE SHOWING SEPARATE PASSAGES FOR WATER AND AIR OR STEAM.

a strip of thermostatic metal composed of two different thicknesses of different metals welded together, as the actuating medium. These metals have different coefficients of expansion, that is, one expands much more rapidly from heat, or contracts more from cold, than the other. This causes the strip to straighten out or curve more, as the case may be.


Cap.
Vent Hole. Is at side toward Radiator, to prevent entrance of dust.
Valve Seat.
Valve Proper. Fits loosely in passage leading to its seat.
Copper Float. Is guided at top and bottom, which makes the Valve come true to its seat. Float rises when water enters Valve Body, thus closing the Valve. When all air is expelled, and steam enters, its heat acts upon the Thermostatic Members, raising the Float and closing the Valve.
Valve Body.
Lower Float Guide.

ARRANGEMENT OF TWO THICKNESSES OF DIFFERENT METALS WHICH OPERATES VALVE.

Special mention is made of the fact that the Russell thermo-metal valve was made possible by the development of a thermostatic metal which contains neither iron nor any other corrosive material, but is composed of two metals


The Valve Seat screws through the Valve Body into this hole.
Outer Section
Outer Section
Inner Section
Inner Section
One-piece Frame which is completely assembled before being placed in Valve Body
Thermostatic Members
Ends upon which Float rests
Lower Guide Hole for Float
Each Thermostatic Member is fastened to Frame by the bottom end of its Outer Section only, by rivet shown, leaving upper ends entirely free. The Inner and Outer Sections are held together only at their upper ends, by the shoulder-rivet shown. Thermostatic Sections are so arranged that a rise in temperature straightens out the Outer Section and increases the curvature of the Inner Section, thus raising the ends upon which the Float rests.

DIFFERENT PARTS OF RUSSELL THERMO-METAL AIR VALVE.

which are stated to be proof against deterioriation of any kind, even when constantly subjected to heat and moisture.

In this air valve completely separate passages are provided for water and air or steam, thus avoiding all tendency for these different elements to oppose each other, and permitting quick and complete drainage. The company's long experience in this field, covering over 30 years, is mentioned as evidence of the reliability of this valve. In size it measures 2 in. in diameter and screws up close to the loop of the radiator. It is made with side outlet and with bottom outlet.

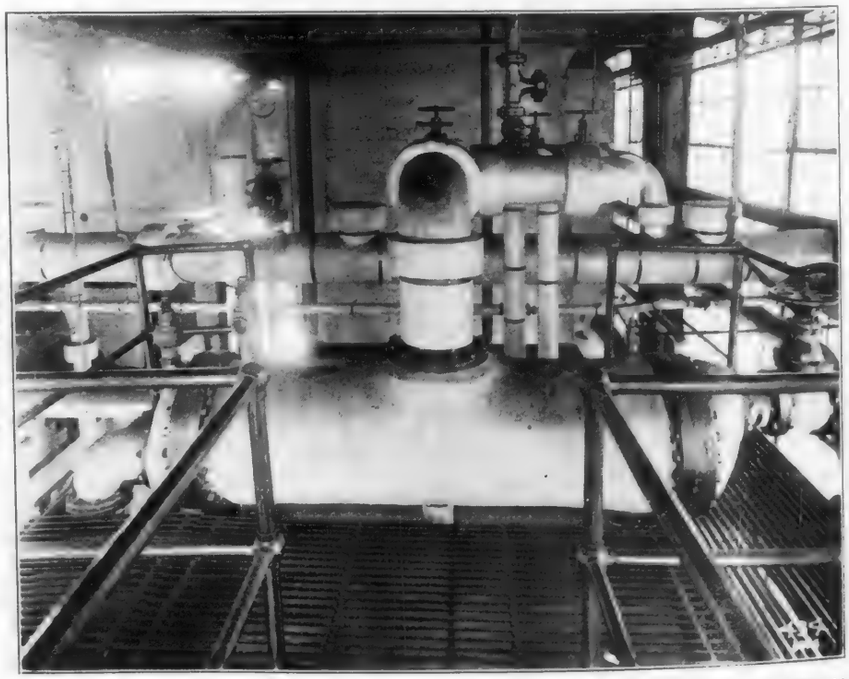
Valve Manufacturers Adopt Standard List Prices.

In an effort to avoid the confusion to architects, engineers and contractors due to the appearance of various valve price lists by the different manufacturers, it is announced that several of the prominent valve companies have now adopted one standard price list, which changes the list prices on practically all of the various packless valves on the market. This action became effective August 15. The manufacturers of the bellows type of packless valve have adopted one standard list, while most of the manufacturers of the so-called spring and disc type of valve have also adopted a standard list. Among the companies which have issued new list prices in accordance with the arrangement mentioned is the Dole Valve Company, Chicago, Ill., Manufacturers of the Dole line of ball-bearing packless radiator valves, the company's bulletin being dated August 15.

Saving the Exhaust Steam in a Water Heating System.

A typical example of fuel saving through the conservation of exhaust steam which would otherwise go to waste is furnished in the installation at the plant of the American Fabric Company, in Bridgeport, Conn. In this case the exhaust steam is made to pass through a Wainwright water heater which, in turn, serves to heat a group of employes' residence buildings.

Calvin W. Rice, secretary of the American Society of Mechanical Engineers, sailed for Rio Janeiro, Brazil, Aug. 18, as the representative of a number of the leading engineering societies of this country at the International Engineering Congress which is being held in connection with the Brazilian International Exposition. At the same time that American engineering societies were singling out Mr. Rice for this honor, the national engineering society of Holland was electing him an honorary member. Mr. Rice will be gone until some time in November.



INSTALLATION OF WAINWRIGHT WATER HEATERS UTILIZING WASTE STEAM AT PLANT OF AMERICAN FABRIC COMPANY TO HEAT EMPLOYES' HOMES.

Trade Literature.

TRANE PUMPS for the mechanical equipment of buildings, containing practical information for engineers, architects and contractors, and described as the official bulletin of the Trane Engineering Department, Pump Division, has been issued by the Trane Co., La Crosse, Wis. It follows the general lines of Trane Data, which was recently issued as Bulletin 11 and was devoted to vapor heating. The new pump bulletin is in accord with the company's policy of furnishing all of the data possible to the industry. Attention is first called to the Trane co-operative engineering service which is established to co-operate with engineers, architects and contractors on all matters pertaining to Trane pumps and Trane heating specialties. The company's condensation pumps, automatic water feeders and circulating pumps are then taken up in detail and suggestions offered for selecting and specifying the proper pump for a given duty. Rules are also given for selecting motors. Under "Notes on the Installation of Pumps," some useful suggestions are offered, together with tables on hot water fixture capacities, conversion table and table of friction in pipes. The concluding pages are devoted to roughing-in dimensions, capacities, etc., of the Trane pumps. Size 6 x 9 in. Pp. 24.

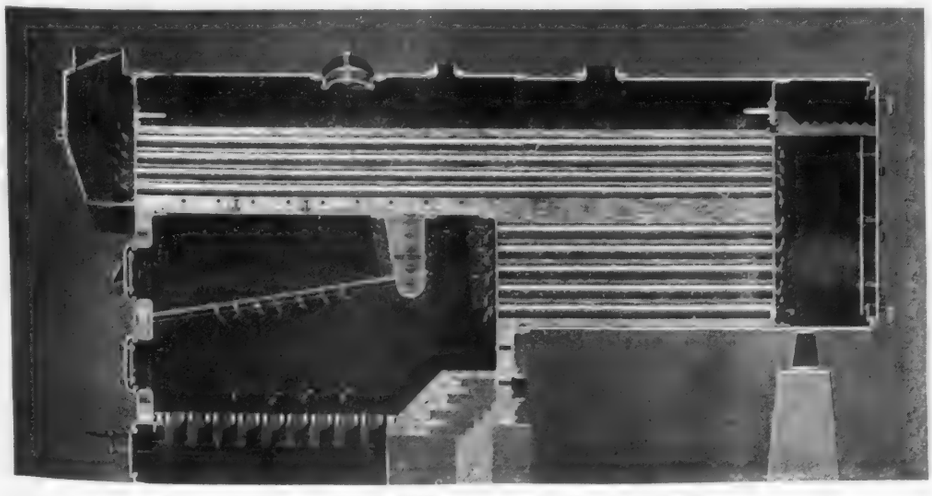
AMES FIREBOX HEATING BOILERS, manufactured by the Ames Iron Works, Oswego, N. Y., are featured in a recent bulletin (No. 800). These boilers, which are of compact appearance, are built to A. S. M. E. standards and are furnished in two types, one with plain furnace for use with anthracite coal, and one with down-draft furnace for the smokeless combustion of bituminous coal. The boilers are made with wrought-steel mud rings, instead of cast-iron, and the fire-door openings are formed by flanging the firebox head outward and the boiler head inward, then making an electric arc welded joint at this point. This is designed to remove a cause for failure in boilers of this type, due to expansion and contraction strains starting cracks from rivet holes. With this method, as the metal is of uniform thickness, strains are evenly distributed. Another advantage claimed for this boiler is the shape of the crown sheet which is a true arch of 180°. This construction of the crown sheet, it is stated, is sufficient to prevent the accumulation of scale-forming matter on the crown sheet. The down-draft type of boiler is furnished with water grates and an integral header which is so placed that it provides additional support and bracing to the crown sheet. Both types of boilers are furnished in standard sizes and emphasis is laid on the point that they are conservatively rated as to capacities. The fact that the manufacturer has been in the business for some 60 years is offered as additional evidence of the character of the Ames line. Size 8 by 10½ in. Pp. 12.

INTERNATIONAL HOT WATER SUPPLY BOILERS, giving the desired data on this line, as well as on the Economy line of water boilers, which are of greater capacity than the hot water supply boilers, are featured in a new catalogue issued by the International Heater Co., Utica, N. Y. Included in the data are the capacities in gallons per hour, square feet of water radiation and nominal tank capacities. This line, it is pointed out, is large enough to cover all the requirements met daily and there are sizes suitable for the small home, large residence, apartment, hotel, garage, barber shop, etc., where this type of heater would be used for domestic hot water supply. Size 6 x 9 in. Pp. 10.

STURTEVANT GENERATOR COOLING APPARATUS, devoted to the use of air filters which are now considered necessary adjuncts to large turbo generators, is the subject of a catalogue issued by the B. F. Sturtevant Company, Hyde Park, Boston, Mass. The limitations in generator cooling, when air is the medium used, is concisely expressed in the statement that "at the temperatures met in the winding of a generator, 36 cu. ft. of air must be heated 1° C. to absorb 1 B. T. U. and to dissipate 8 K. W. loss, 100 cu. ft. of air will be heated 18° C. per minute." Some idea of the amount of dust that may be carried through a generator may be gained from the statement that a large turbo alternator will pass through it its own weight of air in 30 to 40 minutes. As the air in the vicinity of most power houses contains hundreds of thousands of particles of dust per cubic foot, it will be seen what a large amount of dust goes along with this air. Some portion of this dust is bound to lodge in the winding and in a short time the accumulation, it is stated, becomes sufficient to prevent radiation of the heat generated, with a consequent rise in temperature of the windings. Different arrangement of the Sturtevant apparatus for this work are described and illustrated. Size 8½ x 11 in. Pp. 28.

VENTUBE, a flexible air tubing, fungus and acid-resisting, is a new product of the E. I. DuPont de Nemours & Co., New York. It was designed for use in copper mines and is now offered for general use where flexible air tubing is required. Ventube is made by the Fabrikoid Division of the company, but is being marketed by the Explosives Department of the DuPont Company. It is the subject of an illustrated article in a recent issue of the Du Pont Magazine. Multivane blowers, with cast-iron housings, are recommended for use with this tubing. It is preferable, states the company, to have these fans direct-connected for motor drive and of such capacity and speed as will give a velocity of about 2000 ft. per minute at pipe-ends where fairly careful installation has been made. The company also recommends that runs not over 250 ft. be used for 8-in. diameter tubing, up to 500-ft. runs for 12-in. tubing and 16-in. tubing for greater distances.

WEATHER VEIN for August, 1922, published by the Carrier Engineering Corporation, Newark, N. J., tells the story of silk manufacture, under the title of "The Gift of the Worm." The importance of conditioned air throughout the entire process of spun silk manufacture is shown in keeping the delicate yarns elastic, pliable and strong, standardizing the weaving process and thus increasing production. An impressive list of silk plants is presented in which Carrier air conditioning equipment is installed. The Weather Vein for July, 1922, was devoted to the story of the manufacture of bread.



DESIGN OF AMES FIREBOX HEATING BOILER.

ILLINOIS HEATING SYSTEMS, installed in the New Drake Hotel, Chicago, Ill., by the same management that installed them in the Blackstone Hotel, Chicago, in 1909, are made the subject of a circular issued by the Illinois Engineering Co., Chicago, Ill., featuring this fact. As the company states, it may have been good salesmanship that caused the Blackstone management to install Illinois heating systems ten years ago, but their selection for the new Drake Hotel was evidently based on their satisfactory use during the ten intervening years.

COMPARATIVE OPERATING COSTS OF OIL AND COAL, described as a leaflet of useful information on boilers, radiation and oils, has

been issued by the Caloroil Burner Corporation, 27 East 40th Street, New York. In comparing coal and oil costs, the leaflet states that where carelessness has been the rule with coal, 100 gal. of oil will be the heating equivalent of a ton of coal. In other cases, where boilers have been efficiently handled with coal, it will be necessary to burn 135 gal of oil to secure the heating equivalent of one ton of coal. The company states that it uses the maximum figure of 135 gal. to one ton when estimating comparative costs. On this basis its comparative figures are:

1 ton of coal	$13.25
100 gal of oil at 8c. per gallon	8.00
135 gal. of oil at 8c. per gallon	10.80

When speaking of oil consumptions, continues the leaflet, the pound is very often used as the basis of measurement. There are about 7.3 lbs. in a gallon of the lighter grades of fuel-oil (30° to 33° Beaumé), gas-oils or distillates. The B. T. U. per pound in oils are given as: kerosene, 20000; gas-oil 19,200; fuel distillate, 19,400. The comparative heat values of coal and wood are given as:

Anthracite	per lb. 13,500
Bituminous	per lb. 14,400
Coke	per lb. 12,600
Lignite	per lb. 11,700
Dry Wood	per lb. 7,200

In determining the boiler rating in relation to fuel consumption, the following rule is offered: The square feet rating of a steam boiler divided by 50 will give the necessary number of pounds of oil to be burned to secure maximum efficiency. For instance, a 2000-ft. capacity boiler will require 40 lbs. of oil an hour at rating. To burn without smoke the firebox, it is stated, should have ½-cu.-ft. of volume for each pound of oil burned per hour. A good stack draft, it is added, is just as necessary when burning oil as when burning coal. Finally, it is recommended that to secure proper efficiency from a boiler it should not carry more radiation than 60% of its rated capacity.

Bulletins on the Utica-Imperial Super-Smokeless Boiler.

A noteworthy series of bulletins, primarily for the benefit of architects, and devoted to the Utica-Imperial super-smokeless boiler, is being issued by the Utica Heater Co., Utica, N. Y. The whole series comprises seven bulletins, covering, respectively, schools; apartments, hotels and residences; theatres; public buildings; churches; and offices, industrial buildings and garages. The last of the seven bulletins, is largely technical, giving measurements, ratings and other technical information to the architect, heating engineer and steam fitter. The first and second bulletins are out. They contain, among other things, a double-page sectional view of the Utica-Imperial super-smokeless updraft single-grate boiler, showing the application of the Bunsen burner principle, together with numerous view of buildings in the field indicated by the title of the bulletin, in which these boilers are being successfully used. Size of each bulletin, 8½ x 11 in. Pp. 12 and 16, respectively, of Nos. 1 and 2.

Recommendations on the Selection and Operation of Steel Heating Boilers.

Some good suggestions are offered by the Brownell Co., Dayton, O., manufacturers of the Brownell line of steel boilers, on the use of these boilers in apartment houses and larger buildings. The company makes two types of steel heating boilers, the straight draft and the down draft.

"It has been shown by tests," states W. A. Drake, secretary and sales manager of the company, "that the down-draft boiler is more economical than the straight draft, a saving of approximately 25% being possible if correctly fired. This is not the only saving for the reason that smoke is eliminated and, therefore, there is less destruction in the neighborhood because of smoke.

"Flue gases should be kept at as low a temperature as possible and, therefore, the boiler should have sufficient capacity to take care of the load without forcing. The flue gas temperature cannot be kept low under a condition of forcing. It would be better to have some reserve capacity in mild weather rather than to have too little capacity in the cold weather."

Newspaper Builds Model House as Object Lesson.

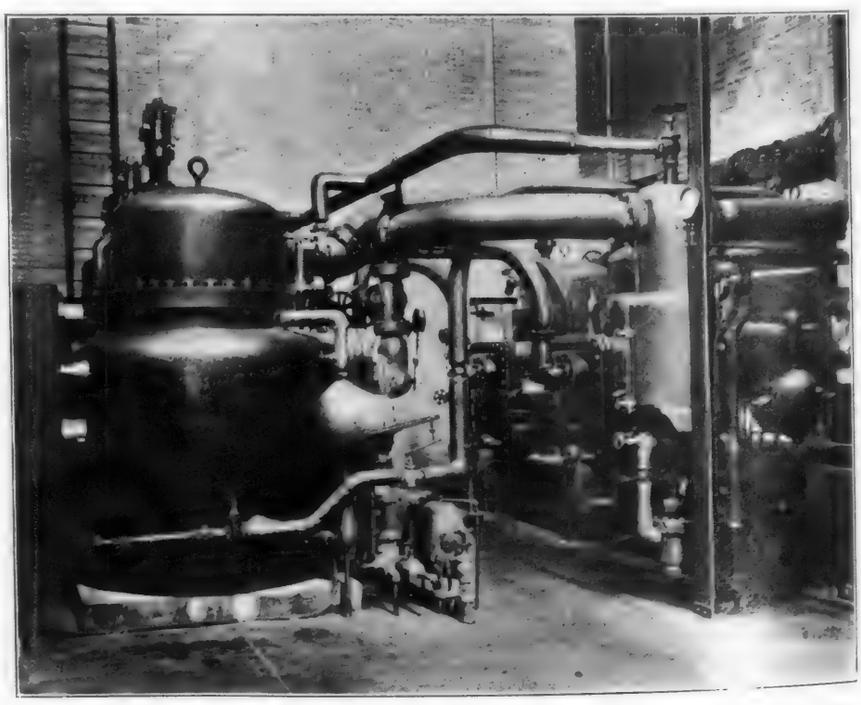
A model house has just been completed in Minneapolis, built by the *Minneapolis Journal* to demonstrate the planning, financing and building of an approved home at moderate cost. The feature became so popular that as many as 1200 visitors called at the house in a single day. The effort "to take the mystery out of home building and establish confidence in present-day home building costs" was apparently successful as Minneapolis has since experienced a home building boom which has broken all records for the city. The model house was a six-room building, estimated to cost $5600.00. The story of its construction was told week by week in the *Journal*. The total cost exceeded the original estimates by only $238.75. A warm-air furnace system was installed, at a cost of $330.00.

Deaths.

Richard D. Reed, of the H. B. Smith Company, Westfield, Mass., one of the well-known figures in the boiler industry, died at his home in Westfield, August 23, following a prolonged illness. He was 60 years old. Mr. Smith has spent his entire business career with the H. B. Smith Company and was considered an authority on boiler manufacture. He was a member of the American Society of Mechanical Engineers and had served on the Boiler Code Committee of that society. He is survived by his widow.

New Water-Purifying Method.

The accompanying illustration shows the relatively new feed-water purifying method which has been developed by the Griscom-Russell Co., 90 west Street, New York, for eliminating impurities from boiler feed before the water enters the boiler. It is known as the Griscom-Russell twin two-effect high heat level evaporator and the installation here shown is that in the plant of the Wichita Falls Electric Company, Wichita Falls, Texas.



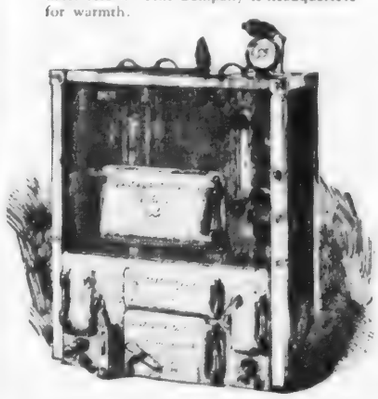
NEW FEED WATER PURIFYING EQUIPMENT INSTALLED AT PLANT OF WICHITA FALLS ELECTRIC COMPANY.

From an etching by M. Paul Rocher, © ARCO 1922

Home of H. E. Faddon, a prominent New York architect, in Ridgewood, New Jersey.
The house is warmed with American Radiators and an Ideal TYPE A Heat Machine

When an architect plans his own home what heating equipment does he specify?

If you plan to build or remodel, send for our book about the IDEAL TYPE A HEAT MACHINE. Mail your request to either address below. This Company is headquarters for warmth.



HOW many regrets would be avoided if Americans would consult their architects more!

Your architect knows the difference between the kind of heating equipment which is merely a purchase; and the kind which is a life-long investment.

If you demand the cheapest boiler and radiators, he can get them for you.

But a better question to ask him is this: "When you planned *your own home*, what heating equipment did you specify?"

AMERICAN RADIATOR COMPANY

Makers of the famous IDEAL Boilers and AMERICAN Radiators

104 West 42nd Street, NEW YORK — Dept. 21 — 816 So. Michigan Ave., CHICAGO

THE ABOVE ADVERTISEMENT recently appeared in a large group of national magazines.

We reproduce it here, believing that every Architect and Engineer will be especially interested in this timely advice to the home builders of America.

Have you complete specifications and ratings of the IDEAL TYPE A HEAT MACHINE in your files? Your name on your letterhead sent to either address above, care of Dept. 106 will bring it.

AMERICAN RADIATOR COMPANY

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

RADIATION COMPUTING

Heating-Steam-

24" Stone or Concrete Wall. Lath furring and plaster on inside

Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.	Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.
20	2	3	3	2	900	99	126	117	108
40	4	6	5	5	920	101	129	120	110
60	7	8	8	7	940	103	132	122	113
80	9	11	10	10	960	106	134	125	116
100	11	14	13	12	980	108	137	127	118
120	13	17	16	14	1000	110	140	130	120
140	15	20	18	17	1020	112	143	133	122
160	18	22	21	19	1040	114	146	135	125
180	20	25	23	22	1060	117	148	138	127
200	22	28	26	24	1080	119	151	140	130
220	24	31	29	26	1100	121	154	143	132
240	26	34	31	29	1120	123	157	146	134
260	29	36	34	31	1140	126	160	148	137
280	31	39	36	34	1160	128	162	151	139
300	33	42	39	36	1180	130	165	153	142
320	35	45	42	38	1200	132	168	156	144
340	37	48	44	41	1220	134	171	159	146
360	40	50	47	43	1240	136	174	161	149
380	42	53	49	46	1260	139	176	164	151
400	44	56	52	48	1280	141	179	162	154
420	46	59	55	50	1300	143	182	165	156
440	48	62	57	53	1320	145	185	168	158
460	51	64	60	55	1340	147	188	170	161
480	53	67	62	58	1360	150	190	173	163
500	55	70	65	60	1380	152	193	176	166
520	57	73	68	62	1400	154	196	178	168
540	59	76	70	65	1420	156	199	181	170
560	62	78	73	67	1440	158	202	183	173
580	64	81	75	70	1460	161	204	186	175
600	66	84	78	72	1480	163	207	188	178
620	68	87	81	74	1500	165	210	191	180
640	70	90	83	77	1520	167	213	194	182
660	73	92	86	79	1540	170	216	196	185
680	75	95	88	82	1660	172	218	199	187
700	77	98	91	84	1580	174	221	201	190
720	79	101	94	86	1600	176	224	204	192
740	81	104	96	89	1620	178	227	207	194
760	84	106	99	91	1640	180	230	209	197
780	86	109	101	94	1660	183	232	212	199
800	88	112	104	96	1680	185	235	214	202
820	90	115	107	98	1700	187	238	217	204
840	92	118	109	101	1720	189	241	220	206
860	95	120	112	103	1740	191	244	222	209
880	97	123	114	106	1760	194	246	225	211

P.A.C.

RADIATION COMP.—Steam Htg., 24-in. Stone or Concrete Wall. No. 13-Q

Copies of this Data Sheet, printed separately, 5 cents each.

THE HEATING AND VENTILATING MAGAZINE 1133 BROADWAY, N. Y. CITY

RADIATION COMPUTING

Heating-Steam-
Windows-Single-Not weatherstripped

Net Exp. Glass	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.	Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.
5	2	3	2	2	225	90	118	107	98
10	4	5	5	4	230	92	120	109	101
15	6	8	7	7	235	94	123	111	103
20	8	10	10	9	240	96	125	114	105
25	10	13	12	11	245	98	128	116	107
30	12	16	14	13	250	100	131	119	109
35	14	18	17	15	255	102	134	121	112
40	16	21	19	18	260	104	136	123	114
45	18	23	22	20	265	106	139	126	116
50	20	26	23	22	270	108	142	128	118
55	22	29	25	24	275	110	144	130	120
60	24	31	28	26	280	112	147	133	122
65	26	34	30	29	285	114	149	135	125
70	28	36	33	31	290	116	152	137	126
75	30	39	35	33	295	118	155	140	129
80	32	42	37	35	300	120	157	142	131
85	34	44	40	37	305	122	160	145	133
90	36	47	42	40	310	124	162	147	135
95	38	49	45	42	315	126	165	149	137
100	40	52	47	44	320	128	168	152	140
105	42	55	49	46	325	130	170	154	142
110	44	57	52	48	330	132	173	157	144
115	46	60	54	51	335	134	175	159	146
120	48	62	57	53	340	136	178	161	148
125	50	65	59	55	345	138	181	164	151
130	52	68	61	57	350	140	184	166	153
135	54	70	64	59	355	142	186	169	155
140	56	73	66	62	360	144	189	171	157
145	58	75	69	64	365	146	192	173	159
150	60	78	71	66	370	148	194	175	162
155	62	81	73	68	375	150	197	178	164
160	64	84	75	70	380	152	199	180	166
165	66	86	78	72	385	154	202	183	168
170	68	89	80	74	390	156	205	185	170
175	70	92	83	76	395	158	207	187	172
180	72	94	86	79	400	160	210	190	174
185	74	97	87	81	405	162	212	192	176
190	76	99	90	83	410	164	215	195	179
195	78	102	92	85	415	166	218	197	181
200	80	106	95	87	420	168	220	199	183
205	82	107	97	90	425	170	223	202	185
210	84	110	99	92	430	172	225	204	187
215	86	112	102	94	435	174	228	207	190
220	88	115	104	96	440	176	231	209	192

P.A.C.

RADIATION COMPUTING—Steam Heating. Single Windows. No. 13-R

Copies of this Data Sheet, printed separately, 5 cents each

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

RADIATION COMPUTING.

Heating-Hot Water-

12" Brick Wall Lath, furring and plaster on inside

Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.	Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.
20	3	4	4	3	900	144	180	167	142
40	6	8	7	7	920	147	184	170	145
60	10	12	11	10	940	150	188	174	149
80	13	16	15	14	960	154	192	178	152
100	16	20	19	17	980	157	196	181	155
120	19	24	22	20	1000	160	200	185	158
140	22	28	26	24	1020	163	204	189	162
160	26	32	30	27	1040	166	208	193	165
180	29	36	33	31	1060	170	212	196	169
200	32	40	37	34	1080	173	216	200	172
220	35	44	41	37	1100	176	220	204	175
240	38	48	44	41	1120	179	224	207	178
260	42	52	48	44	1140	182	228	211	182
280	45	56	52	48	1160	186	232	215	185
300	48	60	56	51	1180	189	236	219	189
320	51	64	59	54	1200	192	240	222	192
340	54	68	63	58	1220	195	244	226	195
360	58	72	67	61	1240	198	248	230	198
380	61	76	70	65	1260	202	252	233	202
400	64	80	74	68	1280	205	256	237	205
420	67	84	78	71	1300	208	260	241	209
440	70	88	81	75	1320	211	264	244	212
460	74	92	85	78	1340	214	268	248	215
480	77	96	89	82	1360	218	272	252	218
500	80	100	93	86	1380	221	276	256	222
520	83	104	96	88	1400	224	280	259	225
540	86	108	100	92	1420	227	284	263	229
560	90	112	104	95	1440	230	288	267	232
580	93	116	107	99	1460	234	292	270	235
600	96	120	111	102	1480	237	296	274	238
620	99	124	115	105	1500	240	300	278	242
640	102	128	119	108	1520	243	304	281	245
660	106	132	122	112	1540	246	308	286	249
680	109	136	126	115	1560	250	312	289	252
700	112	140	130	119	1580	253	316	293	255
720	115	144	133	122	1600	256	320	296	258
740	118	148	137	125	1620	259	324	300	262
760	122	152	141	128	1640	262	328	304	265
780	126	156	144	132	1660	266	332	307	269
800	128	160	148	135	1680	269	336	311	272
820	131	164	152	139	1700	272	340	315	275
840	134	168	156	142	1720	275	344	319	278
860	138	172	159	145	1740	278	348	322	282
880	141	176	163	148	1760	282	352	324	285

P.A.C.

RADIATION COMPUTING—Water Heating. 12-in. Brick Wall. | No. 13-S

Copies of this Data Sheet, printed separately, 5 cents each.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

RADIATION COMPUTING.

Heating: Hot Water
15" Brick Wall Lath, furring and plaster on inside

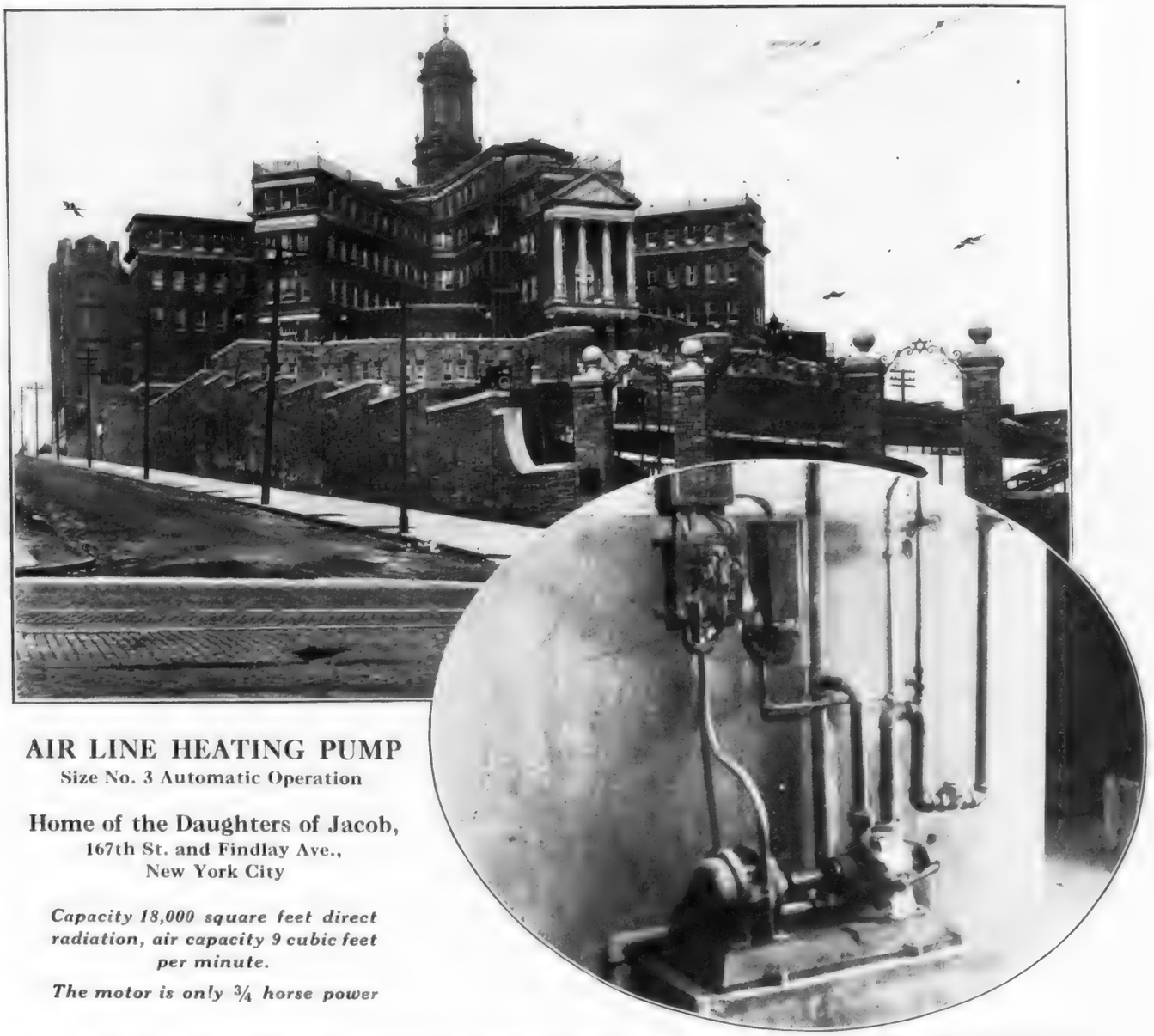
Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E.	E. or S.W.	Net Exp. Wall	Direct Radiation S. or S.E.	N. or N.W.	W. or N.E	E. or S.W.
20	3	4	3	3	900	126	158	144	136
40	6	7	6	6	920	129	162	147	138
60	8	11	10	9	940	132	165	150	141
80	11	14	13	12	960	134	169	154	144
100	14	18	16	15	980	137	172	157	147
120	17	21	19	18	1000	140	176	160	150
140	20	25	22	21	1020	143	179	163	153
160	22	28	26	24	1040	146	182	166	156
180	25	32	29	27	1060	148	186	170	159
200	28	35	32	30	1080	151	189	173	162
220	31	39	35	33	1100	154	193	176	165
240	34	42	38	36	1120	157	196	179	168
260	36	46	42	39	1140	160	200	182	171
280	39	49	45	42	1160	162	203	186	174
300	42	53	48	45	1180	165	207	189	177
320	45	56	51	48	1200	168	210	192	180
340	48	60	54	51	1220	171	214	195	183
360	50	63	58	54	1240	174	217	198	186
380	53	67	61	57	1260	176	221	202	189
400	56	70	64	60	1280	179	226	205	192
420	59	74	67	63	1300	182	228	208	195
440	62	77	70	66	1320	185	232	211	198
460	64	81	74	69	1340	188	235	214	201
480	67	85	77	72	1360	190	239	218	204
500	70	88	80	75	1380	198	242	221	207
520	73	92	83	78	1400	196	246	224	210
540	76	95	86	81	1420	199	249	227	213
560	78	99	90	84	1440	202	252	230	216
580	81	102	93	87	1460	204	256	234	219
600	84	106	96	90	1480	207	259	237	222
620	87	109	99	93	1500	210	263	240	225
640	90	112	102	96	1520	213	266	243	228
660	92	116	106	99	1540	216	270	246	231
680	95	119	109	102	1560	218	273	250	234
700	98	123	112	105	1580	221	277	253	237
720	101	126	115	108	1600	224	280	256	240
740	104	130	118	111	1620	227	284	259	243
760	106	133	122	114	1640	230	287	262	246
780	109	137	125	117	1660	232	291	266	249
800	112	140	128	120	1680	235	295	269	252
820	115	144	131	123	1700	238	298	272	255
840	118	147	134	126	1720	241	302	275	258
860	120	151	138	129	1740	244	306	278	261
880	123	155	141	132	1760	246	309	282	264

P.A.C.

RADIATION COMPUTING—Water Heating, 15-in. Brick Wall. | No. 13-T

Copies of this Data Sheet, printed separately, 5 cents each.

EFFICIENT HEATING *demands the* JENNINGS PUMP



AIR LINE HEATING PUMP
Size No. 3 Automatic Operation

Home of the Daughters of Jacob,
167th St. and Findlay Ave.,
New York City

Capacity 18,000 square feet direct radiation, air capacity 9 cubic feet per minute.

The motor is only ¾ horse power

THE Jennings Pump consists of two independent turbine units, an air pump and a water pump. As each material is handled separately, the boiler pressure is against the water only. The air and vapor, approximately four-fifths of the volume handled, are delivered to atmosphere without back pressure. The saving in horse power is over fifty percent. In other words, the cost of current to operate is cut in half.

Because of its compact design this equipment can be installed in less than one-third the space necessary with other apparatus All interior parts are bronze, supported on annular ball bearings mounted outside of casing. Moving parts revolve without contact.

Quiet, reliable operation without annoyance because of shut downs, and minimum of expense for repairs, is assured if the Jennings Hytor Vacuum Heating Pump is installed on your Vacuum Heating System.

There are many other reasons why the Jennings is being installed on practically all of the big jobs. Bulletin No. 15 gives them in detail. Write for it.

THE NASH ENGINEERING CO.
Plant and General Offices
SOUTH NORWALK, CONN.
SALES OFFICES
BOSTON—185 Devonshire Street
BUFFALO—1034 Ellicott Square
CHICAGO—1220 Monadnock Block
CLEVELAND—326 Frankfort Ave., N. W.
DALLAS—Dallas Bank Building
DENVER—Boston Building
DETROIT—Kerr Building
HOUSTON—Southern Pacific Building
INDIANAPOLIS—Hume-Mansur Bldg.
KANSAS CITY—Mutual Building
LOS ANGELES—218 East Third Street
MINNEAPOLIS—501 S. Sixth Street
MONTREAL—84 Inspector Street
NEW ORLEANS—521 Baronne Street
NEW YORK—350 Madison Ave.
PHILADELPHIA—Stock Exchange Bldg.
PORTLAND—224 Pine Street
PITTSBURGH—Oliver Building
SALT LAKE CITY—Dooly Building
SAN FRANCISCO—Sharon Building
SEATTLE—220 Railway Exchange
ST. LOUIS—Chemical Building
TOLEDO—No. 1-9 St. Clair Street
TORONTO—Kent Building
WASHINGTON—710 14th Street, N. W.

The NASH ENGINEERING COMPANY
SOUTH NORWALK, CONN., U. S. A.

TRADE AND MISCELLANEOUS NOTES

Miscellaneous Notes.

Washington, D. C.—Figures received by the Department of Commerce up to August 25 on business movements during July indicated a recession in the commercial and industrial activity. The slackening of industrial output was attributed "in large measure" to the greater scarcity in fuel supplies and to the difficulties in transportation. Bituminous coal production for July was about 5,000,000 less than in June. Anthracite production almost doubled but at 161,000 tons was still only 2% of the usual normal output. The deficit in anthracite production for the first seven months of 1922 had risen to almost 30,000,000 tons, while the bituminous deficit had increased to 20,000,000 tons. Building contracts let in July declined about 9,000,000 sq. ft., being reported as 51,705,000 sq. ft. This is the lowest figure since last April. There was an increase in the value of building contracts, however, due to large public building awards. Building costs continued to rise.

New York.—The installation of an electric precipitation plant at the Assay Office in New York which is intended to conserve the precious metals which have been going up through the smokestack, calls attention to the fact, as one New York paper put it, that Wall Street has literally been breathing gold. The Cottrell system is being used and the installation will cost $28,000. In addition to the precipitation plant, the system will include a ventilating equipment for the Assay Office.

Pittsburgh, Cal.—A 12,000-gal. oil storage tank is being installed in Pittsburgh, Cal., to hold the oil supply for the heating system for the city hall and the new Memorial library. The tank will be of reinforced concrete and will equal the capacity of a tank car. The saving in purchasing in carload lots is 5 cents a gallon. In addition, a pipe line will be run from the storage tank to the car lines, so that the oil may be transferred by gravity.

Siebel Institute of Technology, Chicago, Ill., announces a three months' course in refrigeration to begin at the opening of the Fall term, September 12. This course was temporarily suspended during the war. The Siebel Institute, it is stated, is the only school in the United States that offers such a short course in refrigeration. All of the other studies taught by State universities and colleges, requiring from two to four years to complete, have been eliminated and only the most essential subjects are given. In addition, the classes are limited in number. The institute is located at 958-962 Montana Street, Chicago, Frederick Stuhlmann, dean.

National Association of Fan Manufacturers, Chicago, Ill., is the sponsor for an advertisement advocating the recirculation of air in school buildings. The advertisement starts off with the statement, "one-half the coal required for heating schools may be saved by recirculating two-thirds of the air." It is pointed out, however, that this result may only be expected when the impurities are removed from the incoming air by air washers. "Recirculation of air," continues the advertisement, "is but one of the vital factors in determining scientific school ventilating methods. Air must not only be properly circulated and distributed, but it must be furnished in ample volume. The air must be of correct humidity and must be free of all

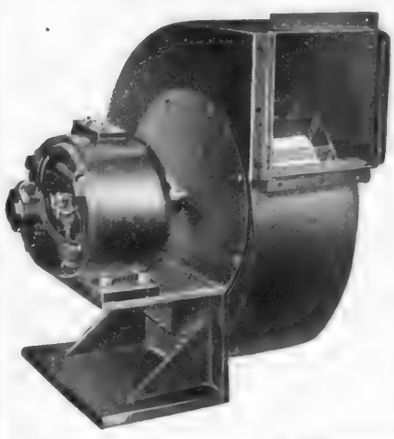
AUTOVENT

THE BUSY FAN SEASON

With Its Many Profitable Opportunities IS HERE

Every local merchant, industrial plant, new building project, home and office in your vicinity is confronted with a ventilating problem during the summer months which can be economically solved with

"An Autovent Fan" or "Uniblade Blower"



Our 1922 Catalog

is now ready. Every architect, engineer and sheet metal worker should have a copy of this "Modern Encyclopedia of Engineering Data."

Bulletin No. 56

very fully covering every detail pertaining to the "Autovent Window Ventilator" is also ready for distribution.

Write For These

Two Business Building Editions

AUTOVENT FAN & BLOWER CO.

Formerly BATTERMAN-TRUITT CO.

730-738 W. Monroe St. Branch Offices in Principal Cities CHICAGO, ILL.

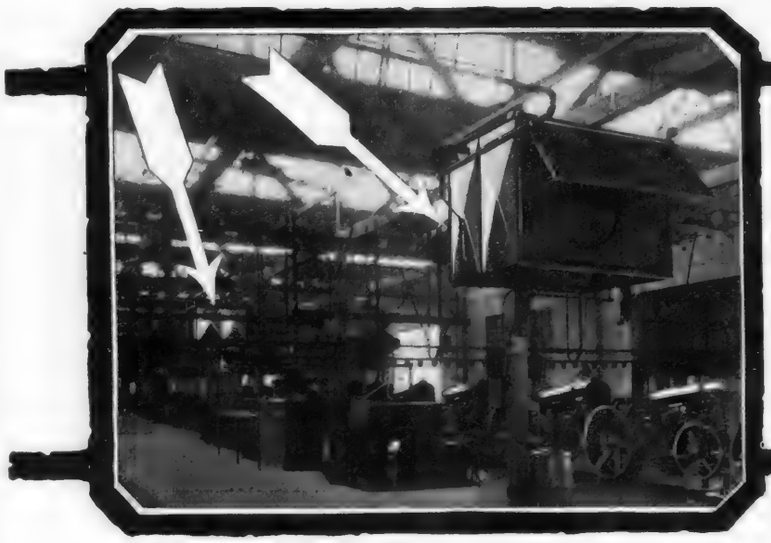
impurities—dust, odors, dirt and bacteria. One of the most important of these factors that assure adequate, healthful ventilation of schools is temperature control. Temperature of the air in the various rooms of a building can be regulated only through scientific ventilating systems."

New York.—A business library to include the ten most authoritative books on each branch of business and industry is being established at the Hotel McAlpin, New York, by L. M. Boomer, managing director of the hotel. Among the industries especially listed is that of heating and ventilating. The method of selection is to analyze the lists received from the 100 leaders in each industry, to find the books which are mentioned the greatest number of times. The ten books in each field most often selected will be included in the library.

Cast-Iron Pipe statistics are given in a bulletin recently issued by the Bureau of the Census, Department of Commerce, covering cast-iron pipe manufacture for 1919. The data given include: persons engaged in the industry, size of establishments, according to the average number of wage earners, for States, and according to the value of products; comparative amounts of products, and several comparative summaries.

Building Contracts awarded during July, in the 27 northeastern States, according to the F. W. Dodge Company, amounted to $35,081,000. This was a 2% increase over June and a 65% increase over July, 1921. The July increase was in central western territory, eastern districts having shown a slight decrease. There was a decline in the volume of residential construction, but this was more than equalized by increases in industrial and public works construction. The figures for industrial plants, $31,882,000, which was 9% of the month's total, was the largest for this class since November, 1920. Residential construction, however, still maintained the lead, amounting to $108,951,000, 31% of the month's total. Public works and utilities amounted to $79,162,000, business buildings to $44,020,000, and educational buildings to $40,690,000. The New England States, with figures of $25,904,000, showed a decrease of 32% from the preceding

—To The Man Who is Interested In More Heat for Less Money ···

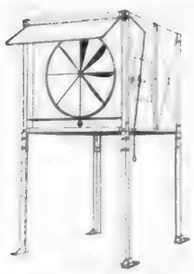


Ford Tractor Plant, Detroit, Michigan

When a mammoth organization like the Ford Tractor Plant makes three installations of ILGAIR Unit Heaters totaling 54 units, it represents an endorsement of one of this country's foremost Industrial plant engineers.

A Valuable Book *for* Architects and Heating Engineere *about* ILGAIR Unit Heaters

Sent on Request



Floor Type
Note Ceiling Type in Picture

HIGH EFFICIENCY ILG VENTILATING MACHINERY

Ventilation

FOR OFFICES · STORES · FACTORIES · PUBLIC BUILDINGS · RESTAURANTS · THEATRES · HOUSES · ETC.

ILG ELECTRIC VENTILATING CO. 2858 NORTH CRAWFORD AVE. CHICAGO

BRANCHES IN ALL PRINCIPAL CITIES

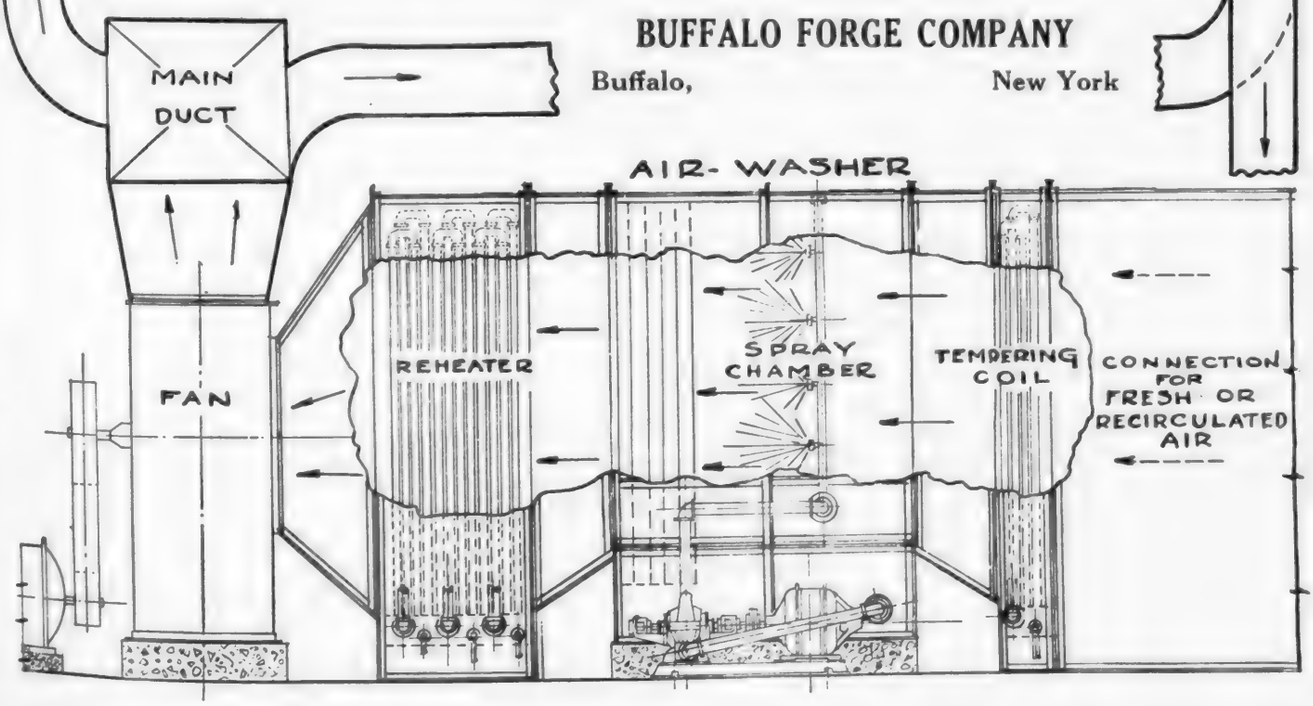
Saves 60% of Coal by Recirculating 85% of Air

according to Mr. E. S. Hallett, Chief Engineer of St. Lou's Board of Education, who compared its heating system with other schools of same size, ozone concentration is kept down to one part per million, building can be brought to proper temperature on zero mornings in 20 minutes. Teachers say, "Best heated and ventilated building we ever worked in."

We have valuable data on this subject collected from 40 years experience. Our representative will be pleased to give it to you without obligation. Write Dept. No. 36.

BUFFALO FORGE COMPANY

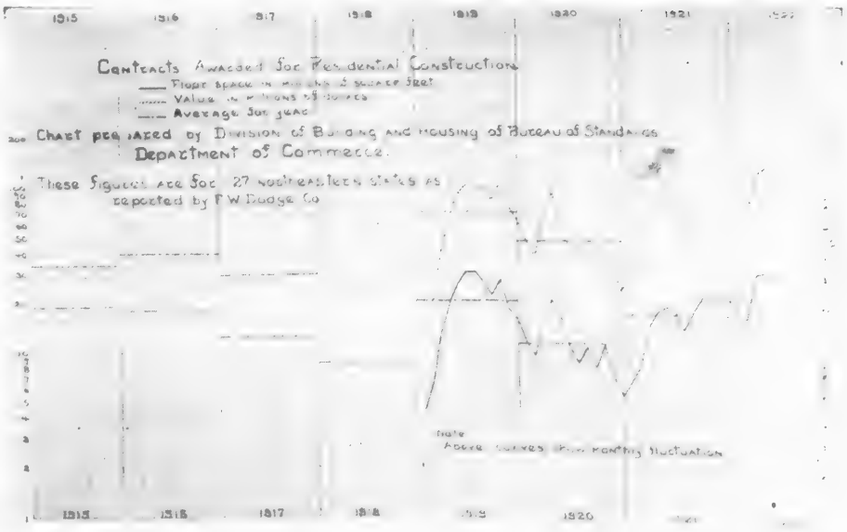
Buffalo, New York



month. New York State and northern New Jersey's total of $76,486,000, represented a decrease of 4% from June. The Middle Atlantic States were within 2% of the June figures with $55,015,000. In the Pittsburgh district, the total of $60,013,000 represented an increase of 10% over June. Records were broken in the central West, the figures amounting to $124,655,000, the largest monthly total on record for this district, being 19% ahead of June and more than double the amount for July, 1921. The Northwest reported a total of 8,008,000, a decrease of 34% from June.

Washington, D. C.—The Advisory Committee on Building Codes, which is working with the Department of Commerce, has prepared a table showing the division of material costs in a typical six-room house, the figures being compiled from operations in 1921. In this table, out of a total material cost of 100%, heating and equipment is put down at 8.4% and plumbing at 10.3%. The principal item is lumber (45%). Electric equipment is listed at 3.6%. The contracts awarded for residential construction during the period from 1915 to date have also been charted by the Division of Building and Housing, of the Bureau of Standards.

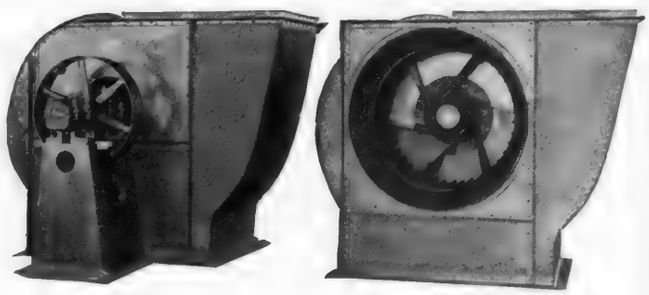
Indiana's State Building Code is up for revision through action taken at a meeting held in Indianapolis, July 18, of representatives of the Associated Building Contractors of Indiana, the Indiana Society of Architects and the Indiana Chapter of the American Association of Engineers. A committee was appointed to take up with Charles Kettleborough, director of the State Legislative Bureau, the codifying of all the existing laws, rules and regulations affecting building construction. This will be followed by the drafting of a proposed new building code.



CONTRACTS AWARDED FOR RESIDENTIAL CONSTRUCTION FROM 1915 TO DATE.

Master Plumbers' and Steamfitters' Association of Westchester County, New York, is enlisting the cooperation of architects in a movement to have all bidders on heating work supplied with proper and complete specifications for heating by the architect, together with plans or layouts of piping. This is being urged in place of what is described as "the present haphazard method of often depending on the naturally biased judgment of the bidders." In response to a letter to this effect sent to all the architects in the county, a number of

LEHIGH
MULTIBLADE
FANS



WHERE large volumes of air are to be handled at comparatively low pressures such as in heating and ventilating systems LEHIGH Multiblade Fans are guaranteed to be equal to, if not superior, to any other fans on the market.

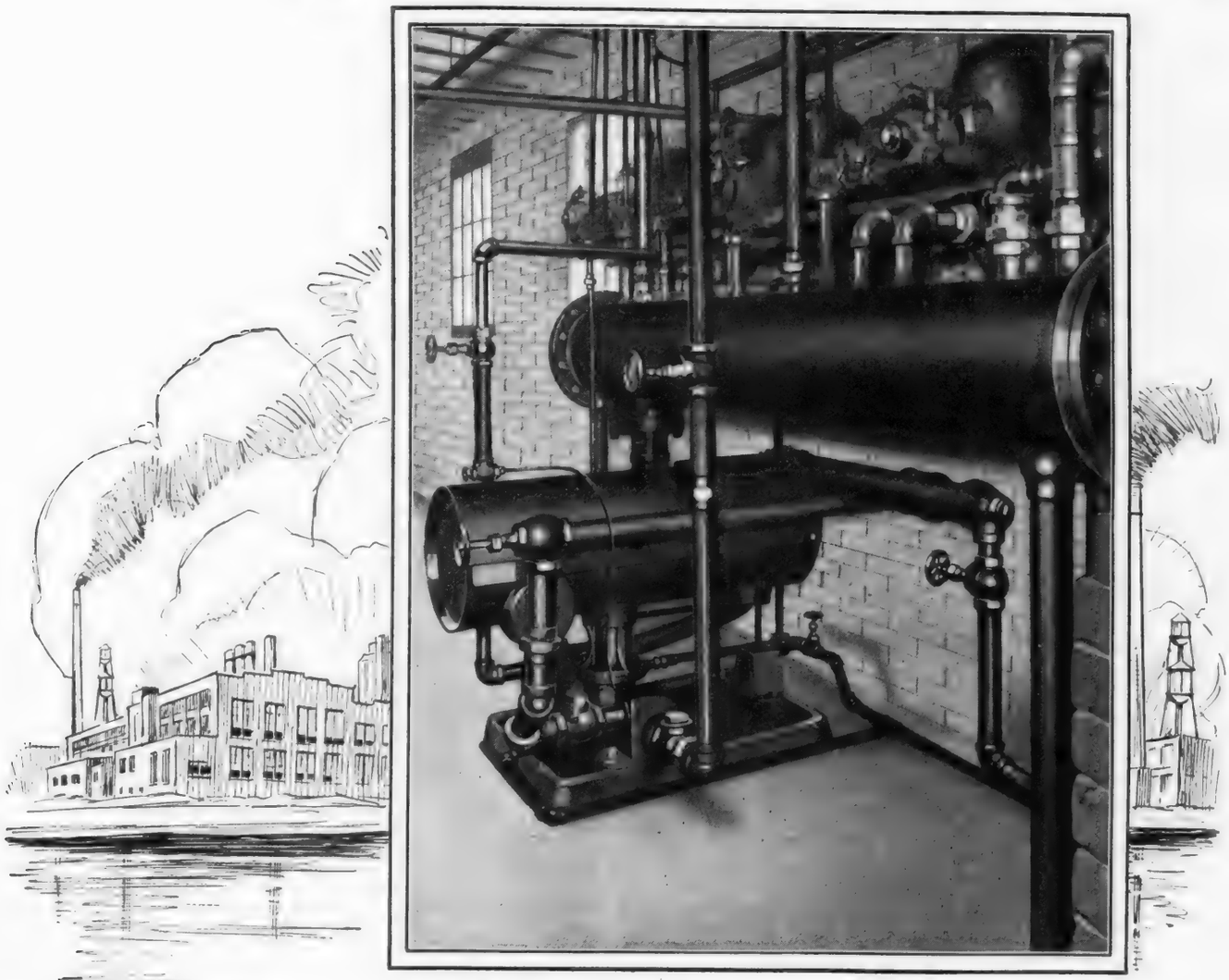
A study of the capacity tables and characteristic curves in the Lehigh catalogue clearly proves this fact.

To further substantiate this statement, your attention is directed to the large inlet and outlet, the cone shaped hub, the absence of stay-rods, the rigid construction secured by special blades running tangent from the hub to the periphery of the wheel and also various other details.

May we send you a copy of our catalogue?

HERSH BROTHERS CO.

654 Mill Street ALLENTOWN, PA.



Keeps Heating Systems At High Temperature

Detroit Steam Trap Systems drain steam lines of all condensation, resulting in reduced fuel costs and the maintaining of higher temperatures in heating systems.

By returning the condensation at a temperature of 212 degrees or higher, direct to boilers, without the aid of pumps, Detroit Systems make possible a fuel saving of 15 per cent or more.

If you have a heating problem—a building difficult to heat because of condensation in steam lines—you are assured that the Detroit Trap System will keep that heating system at topmost efficiency. Write today for our booklet in which the Detroit System is described in detail.

AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

(119)

"Sirocco" Products
TRADE MARK
BLOWERS · EXHAUSTERS · VENTILATING FANS · AIR WASHERS · ENGINES
FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT

replies have been received favoring the suggestion. The next step will be the working out of a plan providing for the cooperation of the architects and the heating and plumbing contractors in the drawing up of heating specifications.

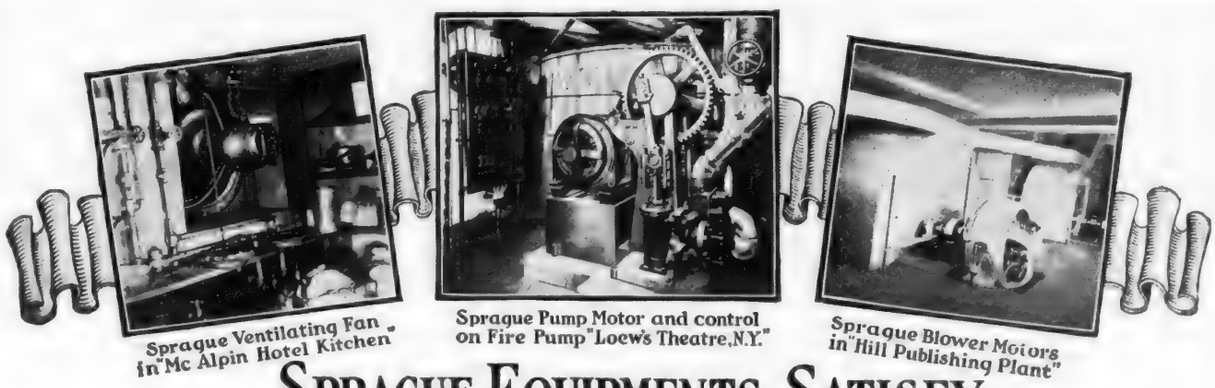
Fire Prevention Exposition, in which for the first time, manufacturers of fire-resistive materials and of fire-fighting and retarding apparatus, will have the opportunity of taking part, will be held October 2-7, in New York, at the 22nd Regiment Armory. The exposition is in charge of the Fire Prevention Committee of the National Association of Insurance Agents. It is also proposed to observe October 2-7 as Fire Prevention Week.

Pennsylvania State College announces that a series of experiments is being conducted at its Engineering Experiment Station on heat losses and heat transmission through various types of building materials. In the announcement of the experiments, made by Porfessor Arthur J. Wood, head of the Department of Mechanical Engineering, it is stated that by means of a complicated apparatus in one of the finest thermal testing plants in the country, studies of heating and refrigerating are now being carried on in which some interesting results have already been obtained. Efforts are being made to expand the institution into a university to provide accommodations for 10,000 students and a building fund campaign is being started to raise $2,000,000 for this purpose.

Heating and Piping Contractors' Association of Cleveland and the Ohio Chapter of the American Society of Heating and Ventilating Engineers, held their joint summer outing this year at Willough Beach, on Lake Erie, August 2. The party was attended by 150 members and guests and continued throughout the afternoon, followed by dancing in the evening.

New York Building Trades Congress, through its Apprenticeship Committee of Building Industries, has issued an appeal to the allied building industries for a fund of $50,000, to enable it to develop its plans for a system of apprenticeship for the various building trades. According to a statement made by the committee, "our labor supply is only about 60% of that available before the war, while our building requirements are much greater." "It is universally recognized," continues the statement, "that the business situation is being injured by the scarcity of skilled mechanics." The committee urges employers to get away from the bonus and premium system and to support the apprenticeship plan of the New York Building Congress, which has been approved by both employers' associations and labor unions. Under this plan it is stated that thousands of men will not only be trained for mechanics, but their entrance into the trade will be guaranteed by the agreement made with the labor unions.

Philadelphia Building Congress was formally organized August 17 by the Construction Conference Group, which, for the past two years, has been functioning informally along lines conforming to the activities of the National Federation of the Construction Industries and latterly of the New York Building Congress. The objects of the organization are "to enable the building and construction industry to promote the general welfare by discovering, through scientific surveys, the needs of the public and of the industry; by finding and recommending ways and means of satisfying those needs; by defining group functions and harmonizing group activities through the formulation of codes of ethics and of practice for the industry, and by other means agreeable to and in the interest of the public and the industry and conformable to law." D. Knickerbacker Boyd was elected president of the congress and among the committees appointed is one on vocational guidance and apprenticeship, one on seasonal unemployment and one on coordinating new construction with maintenance work. At a later meeting it is proposed to appoint a committee on codes and one on public information. A special committee was also authorized


Sprague Ventilating Fan in "Mc Alpin Hotel Kitchen"
Sprague Pump Motor and control on Fire Pump "Loew's Theatre, N.Y."
Sprague Blower Motors in "Hill Publishing Plant"

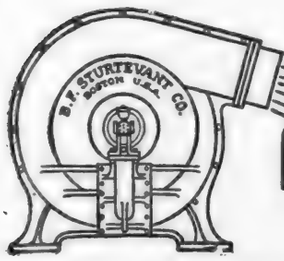
SPRAGUE EQUIPMENTS SATISFY

It Pays to Put in Equipment that Satisfies

Sprague Ventilating Fans, Pump Motors, and Blower Drives have stood the test of time. You will find them doggedly doing service day and night, down in the vitals of many conspicuous buildings in our great cities.

They can be depended upon. They are made *right* and are backed by one of the oldest manufacturers of electrical apparatus in the United States. Write our nearest Branch Office today.

SPRAGUE ELECTRIC WORKS
Of General Electric Company
Main Offices 527 W. 34th St. New York
PIONEERS OF THE INDUSTRY
Branch Offices in Principal Cities



Sturtevant

REG. U.S. PAT. OFF.

PUTS AIR TO WORK

Architects: Graham, Anderson, Probst & White Contractor: J. J. Sherin

Main Banking Room, Federal Reserve Bank Building, Kansas City, Mo.

In Kansas City

Wherever an impressive structure, such as the Federal Reserve Bank Building of Kansas City, is to be erected the architect invariably turns to Sturtevant for the Heating, Ventilating and Air Washing Equipment.

Because he knows how reliable and satisfactory such equipment has proven in hundreds of similar installations all over the country.

The benefit of the broad experience is yours for the asking. Our engineers will gladly cooperate with you in laying out an adequate System for any type of building.

A call on our nearest office will place the services of these specialists at your disposal.

B. F. STURTEVANT COMPANY

HYDE PARK, BOSTON, MASS. 643

on "Sesqui-Centennial Construction Matters."

National Trade Extension Bureau will hold its annual conference of advertising and sales managers at its headquarters in Evansville, Ind., October 19-21, immediately following the meeting of the Central Supply Association.

Carnegie Institute of Technology, Pittsburgh, Pa., in its bulletin of the College of Industries, gives particulars of the various courses in this college, including those on building construction and on heating, ventilating and sanitary equipment. The Fall semester begins September 18. The heating, ventilating and saintary equipment course is in charge of Assistant Professor Samuel E. Dibble.

Professor F. E. Giesecke, head of the Engineering Research Division of the University of Texas, has been at the University of Virginia during the summer where he has had charge of one of the summer courses in mechanical engineering.

William J. Baldwin, M. E., New York, who is known as the dean of the heating and ventilating profession, announces the removal of his offices to the Thomas Jefferson Building, 4 Court Square, Brooklyn, N. Y.

Manufacturers' Notes.

American Blower Co., Detroit, Mich., held the annual meeting of its branch managers at the company's home office in Detroit, July 24-26.

Stark Sheet Metal Works Co., Canton, O., announces its removal to larger quarters at Rex and 2nd Streets, S. E., Canton. The company is offering at special prices its stock of Mack ejector rotary ventilators.

BRANCH MANAGERS OF AMERICAN BLOWER COMPANY AT HOME OFFICE.

Schaeffer & Budenberg Manufacturing Co., with works and general offices in Brooklyn, N. Y., announces that it has acquired the business of the American Steam Gauge and Valve Co. of Boston, Mass., and will operate it as a division of its own business, with headquarters and sales department at 338 Berry Street, Brooklyn, N. Y. These two companies, while operating as one, will continue the manufacture at their respective plants of their various instruments for measuring pressure, tem-

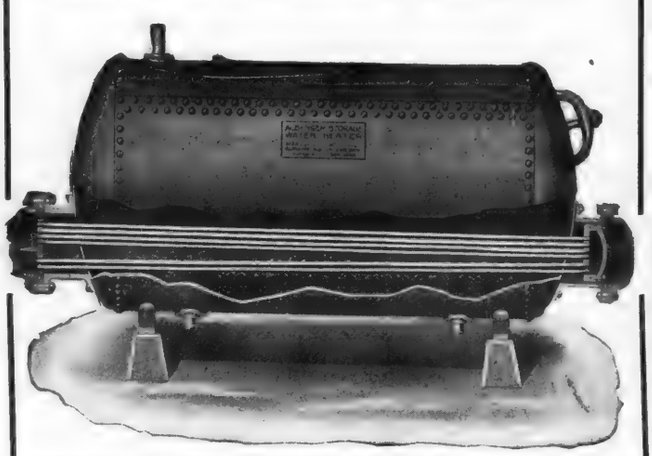
Reducing Hot Water Costs

WITH

ALBERGER
(Buffalo)
HEATERS

A plentiful hot water supply will always be available at the minimum cost. Let us tell you how it is done.

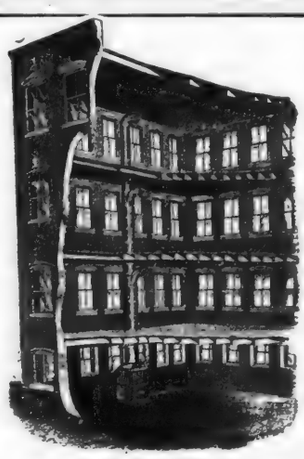
Alberger Heater Company, Buffalo, N. Y.



AIR CONDITIONING TRADE MARK

APPARATUS for maintaining artificial atmospheric conditions in industrial plants.

ATMOSPHERIC
CONDITIONING CORPORATION
LAFAYETTE BLDG.
PHILADELPHIA



PORBECK INDUSTRIAL AIR HEATER

Adapted for heating and ventilating large buildings. No need of distributing pipes. Takes full advantage of the laws of nature in the production of warmed air and utilizes these laws in providing an even distribution of warmth and comfort throughout the largest of buildings.

Sales representatives wanted

PORBECK MFG. CO.
1000 N. Market St., St. Louis, Mo.

Peerless Ventilator

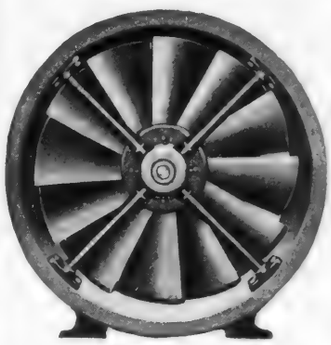
BUILT RIGHT RUN RIGHT

The New York Blower Co.

Chicago, Ill. La Porte, Ind.

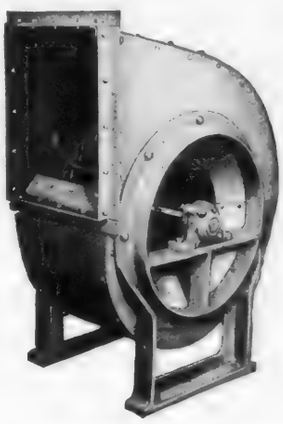
Peerless Air Washer

We manufacture a complete line of fan equipment and appurtenances. By concentrating on this one class of products we are able to make them better every year.



Pulley Driven Disc Fan for Mines

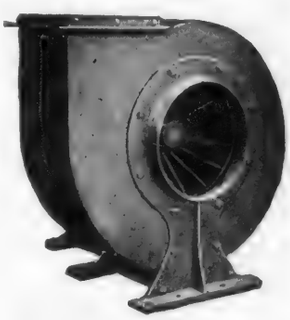
The old fallacy that fan equipment was a luxury is now known to be untrue; it is an economical necessity. We can give actual installations in all kinds of industries where through the wise employment of fan equipment manufacturers have improved the quality of their product, and increased production with a reduction in factory cost.



Type "C" Seri-Vane Fan

If you are interested in drying, humidifying, heating, ventilating, mechanical draft, removal of shavings or similar installations, please communicate with us. If we cannot honestly prove facts to you showing the benefits that will follow from an installation for your special problem, we will frankly so state.

Motor Driven Propeller Fan

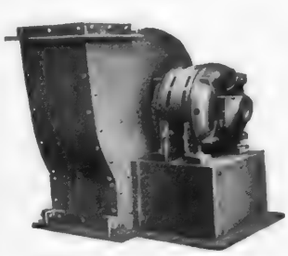


Slow Speed Planing Mill Exhauster

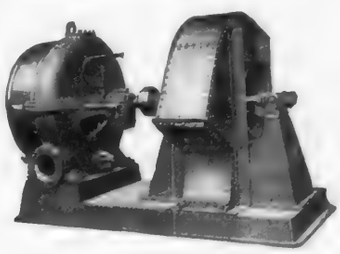
The New York Blower Co.

Chicago, Ill. La Porte, Ind.

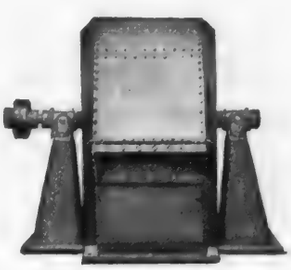
Branch Offices in Principal Cities



High Speed Type "C" Seri-Vane Fan



High Pressure Blower Direct Connected to Turbine



Stoker Fan

perature, power, speed, etc. No radical changes, it is stated, are to be made in the company's executive personnel. The factory lineup, also, remains undisturbed. The history of these companies runs strikingly parallel. The Schaeffer and Budenberg Manufacturing Company was founded in 1850; the American Steam Gauge and Valve Company a year later. In the early days, the two companies were keen rivals in kindred lines. For more than three quarters of a century, the Schaeffer & Budenberg Manufacturing Company has been engaged in the manufacture of thermometers, gauges, temperature controllers and other instruments which have played an important part in the development of processes covering a broad technical field. The American Steam Gauge and Valve Company began the manufacture of steam specialties in 1851 when steam, as a motive power, was still in its infancy. The American line was expanded from time to time until the company's plant became the largest of its kind, and its products embraced a wide range of specialties, including gauges, steam traps, thermometers, oil and grease extractors, etc.

Carrier Engineering Corporation, Newark, N. J., is arranging to establish a company in England under the same name. J. I. Lyle, treasurer and general manager of the company, has recently returned from England where he took the preliminary steps in organizing the new company.

Detroit Lubricator Co., Detroit, Mich., announces that it has merged with the American Radiator Company. The company has a plant at Trumbull Street, running from Marquette Street south to the railroad. A large addition was completed about a year ago. Under the terms of the merger, stockholders of the Detroit Lubricator Company receive four shares of a new preferred stock of the American Radiator Company in exchange for each share of their stock. As the Detroit Lubricator Company is capitalized at $900,000 consisting of $600,000 of common stock and $300,000 in preferred stock, the consideration involved in the deal is $3,600,000.

Hoffman Specialty Co., Bridgeport, Ct., has appointed H. P. Kahr as one of its sales engineers, with headquarters in the company's New York Office. Mr. Kahr was formerly connected with the Typhoon Fan Company.

National Asbestos Manufacturing Co., Jersey City, N. J., reports among recent orders, one for several thousand Pyro-Bestos blocks, 3 in. wide by 36 in. long, for the New York Steam Company. These blocks will be applied to the company's underground steam mains.

Heating & Power Appliance Company, Milwaukee, Wis., has commenced marketing its line of heating specialties which are being manufactured at the company's plant at 200-210 Pleasant Street, Milwaukee. The officers of the company are: President, F. L. Hutchinson; vice-president, M. V. Eicholtz; secretary and treasurer, W. N. Tuckwell.

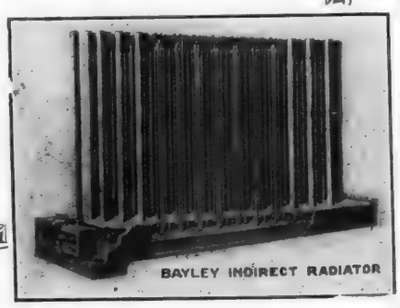
Fitzgibbons Boiler Co., Inc., New York, advises us, through its vice-president, James D. Erskine, that the item appearing in last month's issue, to the effect that the Fitzgibbons Boiler Company had been reorganized under the name of the Joseph Fitzgibbons Boiler Corporation, is incorrect. The Joseph Fitzgibbons Boiler Corporation is an entirely separate organization. The business of the Fitzgibbons Boiler Co., Inc., was established more than 35 years ago and is being conducted and continued under the same name. In the past ten months the plant has been enlarged by three modern fireproof buildings. The capacity and production have been doubled and will be still further increased. The entire old equipment has been overhauled and motorized.

Bayley

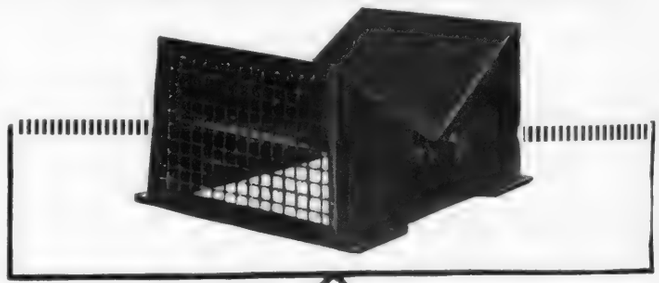
HEATING AND VENTILATING EQUIPMENT

has proven its superiority in every test to which it has been put. The Plexiform Fan excels through its ease of operation, freedom from breakdown troubles and space economy: The Chinook Heater through the fact that each tube is a complete radiator in itself and therefore free from elbows, return bends and nipples which makes replacements possible without disturbing the installation, and because it can be shipped K. D. and assembled in place, thus saving freight. There are many other reasons why you should install Bayley Equipment. Our engineers and free literature will explain them. Write today.

Bayley Mfg. Co.
Dept. E.
Milwaukee
Wis.



BAYLEY INDIRECT RADIATOR



The "Camelback" Air Diffuser

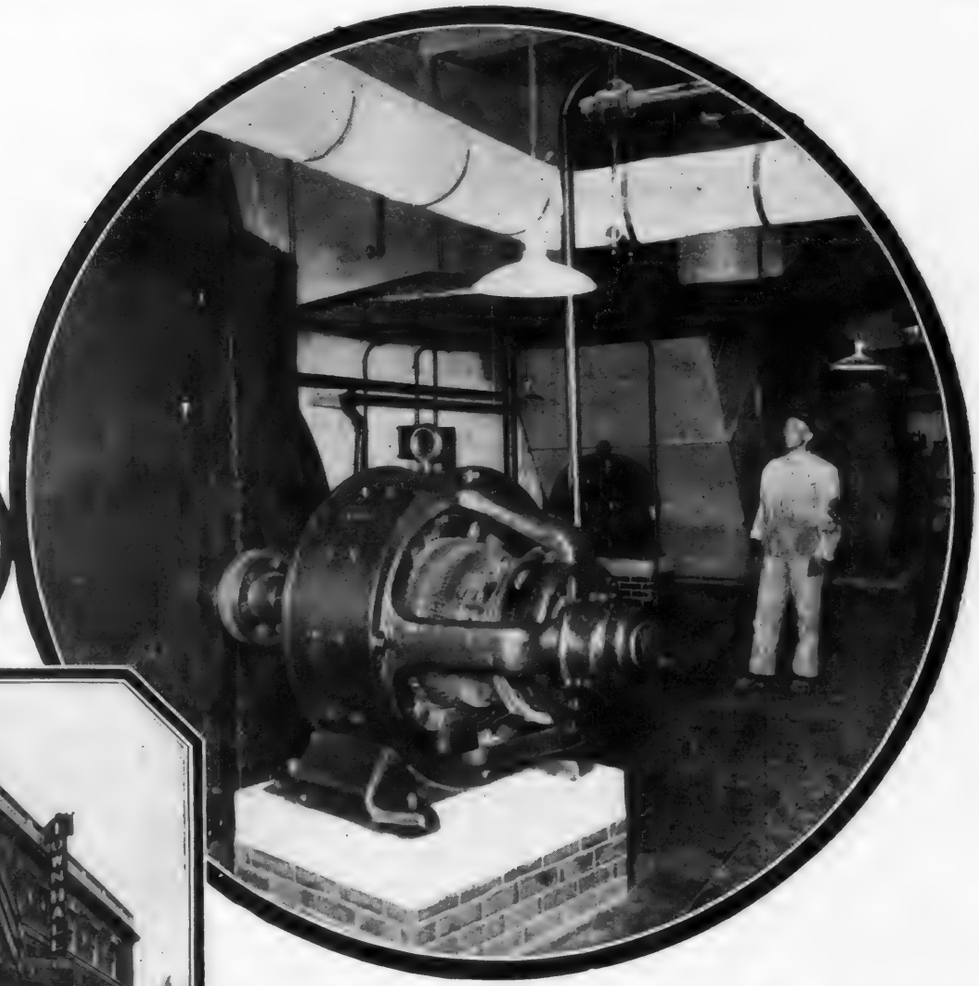
is a device which architects and engineers have found that by its use the desired volume of fresh air is introduced and distributed throughout the auditorium at a minimum of cost and friction loss.

BECAUSE

1. Less duct work is required, saving a great expense in masonry.
2. Its construction of two way air delivery at ends, permits the discharge of the maximum quantity of air with the minimum number of diffusers.
3. Its angular shape makes it uncomfortable as a foot rest.
4. Friction loss is negligible
5. It admits of the use of the lowest slung chair seat.
6. It is made of heavy cast iron with wire screen over ends, and is guaranteed to last.
7. It has two controlling dampers, regulated independently of each other and is furnished without dampers if desired.

Every Architect and Engineer owes it to his clients to be well informed on latest ventilating practices. For that reason you should be familiar with the "**Camelback.**" Send for Blueprints.

Knowles Mushroom Ventilating Co.
202 Franklin St. **New York City**
Manufacturers of Knowles Aisle-Hood, and Mushroom Notch



The Townhall of the League for Political Education, New York City.

Another New York Installation

The Town Hall for the League of Political Education is another of New York's recent structures in which the ventilating equipment is Westinghouse Motor-Driven.

Together with the Bankers' Trust Building, the Seaboard National Bank and the Mt. Siani Hospital, it represents a list of New York's latest and finest buildings. All are Westinghouse Equipped.

Westinghouse has a complete line of ventilating motors of all sizes, styles and types applicable to all industrial, private or public ventilating systems.

Westinghouse Electric & Mfg.Co.
East Pittsburgh Pa.

Offices in all Principal American Cities

Westinghouse

A new power plant and special plate-working equipment has been installed for fabricating boilers up to 350 H. P. and carrying pressures up to 160 lbs.

Central Station Heating Notes.

Coshocton, O.—Authority to discontinue furnishing heat to the city of Cochocton and to abandon its heating facilities was given to the Ohio Service Company by the State Public Utilities Commission July 20. The local papers state that "consternation reigned supreme among the heat consumers who had learned of the decision." The underground mains, it is stated, will not be removed. Figures given out by C. H. Howell, vice-president of the company, indicated that a large proportion of the company's patrons had made preparations for supplying their own heating needs. Originally the service company had 101,000 sq. ft. or radiation on its lines. The last survey showed 69,000 sq. ft., and it was then estimated that 25,000 sq. ft. of that would be supplied by private plants before the opening of the next heating season. That would leave a balance of 42,000 sq. ft. of heat radiation to be cared for before the arrival of cold weather. Recent estimates on the cost of installing steam heating plants averaged $1.00 per square foot. At that rate, $42,000 must be expended by the erstwhile hot water consumers for private plants.

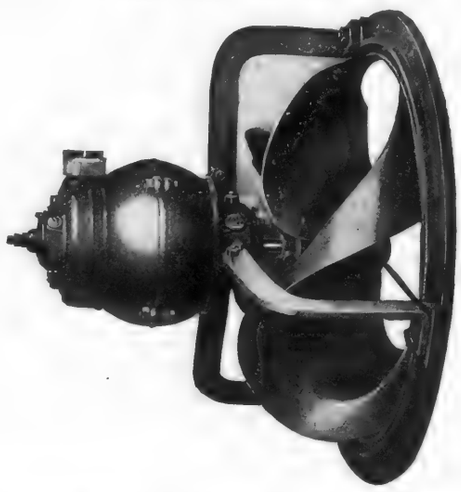
Lansing, Mich.—The city council has arranged to have the city hall supplied with central station steam heat. No charge is to be made for the necessary connections and extensions, provided the city uses the service continuously during the winter months.

Clinton, Ill.—The Clinton Gas & Electric Company has appealed to the State Public Utilities Commission for permission to increase its heating rates. Figures were presented showing that the company's percentage of profit for the past year was only about 1 3/5%. In order to earn a profit of 7% and 3% additional as a depreciation fund, it is estimated that the rates would have to be raised from 35% to 40%. Many of the business houses served by the company not only have no individual heating plants, but in many cases have no flue pipes or chimneys. At a hearing on the petition the consumers were represented by George J. Smith.

Bad Axe, Mich.—Plans for the new central heating plant in Bad Axe were laid at the first meeting of the new central heating company's directors, held at that place July 17. Plans for pipe lines were approved and construction bids invited. It is planned to have the work of pipe laying and machinery installation completed for use this year, at least for the business section. Waste steam from the Central Power Company's plant, which furnishes electricity to Bad Axe, will be used in the heating system. The Central Power Company and the new heat company will be connected with the Detroit Edison public utility organization when the Thumb circuit bearing a continuous electric current from Detroit to the tip of the Thumb is installed.

Grand Rapids, Mich.—General approval of the Consumers Power Company's proposed central heating project, reported last month's issue, was expressed in committee of the whole of the city commission at its meeting August 3. The service committee recommended that a contract for the $900,000 installation be approved. This would permit the company to lay steam mains in the heart of the downtown business district. The system will, in a general way, afford opportunities for heating all buildings from the Union Station to Michigan Street, between the river and Jefferson Avenue. Many years ago the company took over sixteen steam heating lines of the Edison company which have served some of the largest buildings in Grand Rapids. Much of the present equipment, however, will be replaced if the present project goes through. According to the proposed contract, the Power company will lay mains on Ottawa Avenue from the south side of Monroe Avenue to the north side of Crescent Street; in Pearl Street, from Ionia alley to Division Street; in Louis Street, from Market Avenue, one-half block west, where the end will connect with an old installation.

MASSACHUSETTS
DAVIDSON PROPELLER
FANS



Are especially suitable for handling large volumes of air at low resistances.

Massachusetts Blower Co.
Watertown, Mass.
Sales Offices in Principal Cities

THE IMPACT AIR WASHER

Comprises a number of important features.

Highly Effective Dust Removal

The "Impact" Washer is guaranteed to remove 95 per cent of such dust as is found in ordinary city air. Extra-intimate contact of air and water is effected by the use of nozzles of our "Impact" type which due to their special construction and arrangement produce a dense and uniform mist or spray.

Uninterrupted Service

The "Impact" type of nozzle produces a flat, fan-shape spray by the impact of two jets from large smooth orifices, there being no internal spirals or passages whatever to become clogged with sediment. For the further prevention of plugging our special scale arrester is placed just back of each spray head. This arrester with its numerous holes each slightly smaller than the nozzle orifices, intercepts and retains all bits of sediment and scale which would not pass the nozzles. The accumulation on this strainer is slow and is quickly removed while washer is operating.

Other exclusive features. Ask for Booklet K.

THE COOLING TOWER CO., INC.
15 John St., New York

TO INSURE MAXIMUM VENTILATION AT A MINIMUM EXPENSE?

This is a question which is now confronting a large number of School Boards, and which may cause them many hours of worry and regret, not only before they select the type of System, but after same has been installed.

BUCKEYE HEATOVENTS, the ideal Heating and Ventilating Units, will solve the problem, prevent worry, and leave no regrets, as they insure the best of ventilation at the lowest known cost.

In fact, Buckeye Heatovents will save as much as thirty (30) per cent on your ventilation cost, as compared with any other type of ventilating system.

We are in position to make quick shipment of any number of Heatovents, so that you can have them ready for the coming cold months.

Our Engineering and Service Departments are ready to assist or cooperate with any Engineer or Architect by furnishing proper data and information for designing the Unit system for Banks, Offices, Clubs, Lodges, Schools, Churches, Auditoriums, Gymnasiums, etc., without any obligation.

BUCKEYE BLOWER CO.

COLUMBUS, OHIO

BRANCH SALES AND ENGINEERING OFFICES

BUCKEYE BLOWER CO.
324 Monadnock Bldg.
Chicago, Ill.

BUCKEYE BLOWER CO.
503 Wabash Bldg.
Pittsburgh, Pa.

BUCKEYE BLOWER CO.
1400 Broadway
New York, N. Y.

BUCKEYE BLOWER CO.
372 Whitehall St.
Atlanta, Ga.

New Incorporations.

Burens Heating and Ventilating Company, Cleveland, O., capital $5,000. Incorporators: Edward F. Burens, John G. Romanoff, George Nesheff, P. N. Mitchoff and L. H. Wolfe.

Central Blow Pipe Co., 1444-140 S. Dearborn St., Chicago, Ill., capital, $10,000. Incorporators: Gustav A. Kluge, Adolph L. Katz, William C. Vollbrecht. To manufacture and install blow pipe systems, ventilating systems.

Heat and Cold Co., Inc., 1445 Broadway Avenue, Detroit, Mich., capital, $10,000, to deal in refrigerating and heating appliances and apparatus.

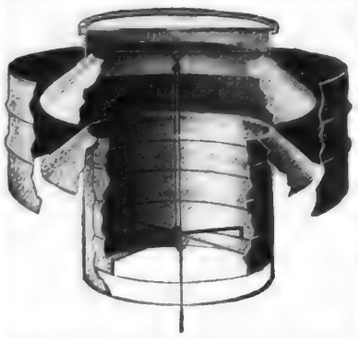
Acme Heating and Ventilating Co., 7527 S. May St., Chicago, Ill., capital $20,000. Incorporators: O. F. Olsen, Charles Runkel, Emma F. Runkel.

Brunswick-Kroeschell Co., 440-472 West Erie St., Chicago, Ill., has been incorporated to take over the business of the Brunswick Refrigerating Company, New Brunswick, N. J., Kroeschell Bros. Company and Kroeschell Bros. Ice Machine Company, of Chicago. The company will maintain the present offices and factories in New Brunswick and Chicago, as well as the various branch offices. The personnel of the former companies will also be retained.

Furnace Fan Co., Kalamazoo, Mich., organized to manufacture appliances used in connection with warm-air furnace systems. The company has secured an option on a vacant plant in Kalamazoo which it will operate on a patent taken out by Nathaniel B. Wales on a fan operated by a steam jet as a self-contained unit. A heating element is attached to the side of the firepot of the furnace which generates the steam to operate the fan. Incorporators: N. B. Wales, Kalamazoo; Dr. F. N. Bonnie, Niles, Mich.; and Marinus Vander-Maas, Plainwell, Mich.

Hyde-Schneider-Haley Mfg. Co., Rockford, Ill., capital $50,000, to manufacture heating and plumbing specialties. Incorporators: W. F. Hull, L. B. Schneider.

The Ideal Ventilator



You should know more about the Burt combination ventilator and skylight that has the exclusive feature of a sliding sleeve damper. No matter how much or how little ventilation is required, the light is never obscured.

THE BURT MANUFACTURING COMPANY
261 Main St., Akron, Ohio

PROOF!

23 installed on the Crown Cotton Mills, Dalton, Ga.

24 installed on the Botany Worsted Mills, Passaic, N. J.

41 installed on the Pittsburg Valve & Fittings Co., Barbeton, Ohio.

18 used by Minnesota State Training School, Red Wing, Minn.

and

Thousands of installations on all kinds of buildings all over the country.

Cycloidal
MULTIVANE FANS
TRADE MARK

Heating and
Ventilating
Apparatus
Fans and
Blowers

Garden City Fan Co.
Manufacturers since 1879
McCormick Bldg.
CHICAGO

Eastern Office
Cochran & Wrightson
47 W. 34th Street
New York

Ross

Surface Barometric and Jet Condensing Equipments for Power Plants. Main, Auxiliary, Distilling Condensers & Evaporators for Marine Service. Distilling Condensers for Refrigeration and Chemical Plants.

Crosshead Guided" Expansion Joints
Ross Boiler Feed Water Heaters.
Ross Oil and Sugar Juice Heaters.
Gravity & Forced Circulation Heaters.
Ross Oil, Air and Water Coolers.

ROSS HEATER & MFG. CO., Buffalo, N. Y.

THE BRAND THAT LEADING ENGINEERS DEMAND

Heating and Ventilation
STANDARD DATA SHEETS

SOME SUBJECTS

B. T. U. Losses
Ducts and Flues
Chimneys
Fittings
Pipe Covering
Flow of Steam in Pipes
One Pipe Steam Systems
Vacuum Heating Systems
Vapor Heating Systems
Gravity Water Heating

225 Sheets Covering 25 Important Subjects
Price 5 Cents per Sheet

Send for folder giving full list and special prices on sets and folder

HEATING AND VENTILATING MAGAZINE CO.
1123 Broadway, New York City

JAMES M. SEYMOUR

Established 1888

Lawrence St., Mechanic St. and Kirk Place
NEWARK NEW JERSEY

PROPELLER TYPE FANS

Many styles for many kinds of service. Low pressure Fans that deliver immense volumes of air at low velocity.

Cone cased Fans for higher pressures, Extreme Fans for high pressure and high velocity.

Compound Fans from 11 feet in diameter to 24 feet in diameter for Mine Ventilation.

Hyatt Roller Bearings. Anti-Friction Metallic wick, self-oiling bearings, and Ball Bearings if the purchaser prefers.

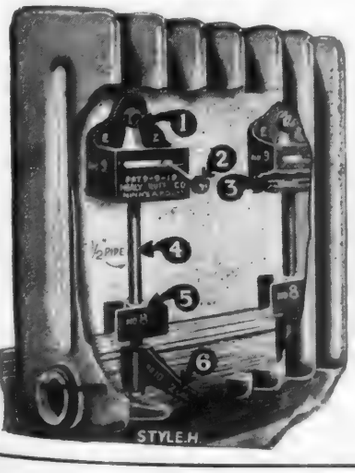
SEYMOUR FANS are not an experiment. Over 100,000 now in service. Built of the best materials. Good Workmanship. Commercially Attractive Prices.

SEND FOR BULLETINS

RADIATION LOGIC

The wall is the only logical setting for radiation. When radiation is set on the wall it may be cleaned from all angles and offers no obstruction when cleaning and finishing floors.

When radiation is supported by E-Z RADIATOR HANGERS economies and conveniences are effected. With E-Z Hangers anchor bolts may be set during progress of construction without accurate measurement and radiators hung. Thus a great saving of time is gained.



Appearance, convenience, increased floor space and decreased installation cost demand the use of E-Z Radiator Hangers.

HEALY-RUFF CO.,
Plymouth Building
Minneapolis, Minn.

Why

Coal costs money—even under normal conditions. Why waste it?

Urge your clients to install Automatic Temperature Regulation for economy's sake.

The best servants are those least seen. Likewise, *Powers Temperature Regulation* serves best because it is least in evidence; its perfect service is accepted, year after year, without annoying adjustments or repairs.

The true gradual action of the *Powers Vapor Disc Thermostat*, plus conscientious Engineering Service, make such results possible—and certain.

It pays your client in comfort and convenience—it pays you in future peace of mind—to be sure it is a *Powers System* wherever Temperature Regulation is desired.

The Powers Thermostat

—the heart of the Powers System of Temperature Regulation—is built on the vapor disc principle. Its sensitiveness to thermal changes is as immutable as the underlying principle of mathematics.

That's why the Powers System is famous for long service, without repairs or adjustments.

The first cost is usually higher than for other systems—the cost per year much lower.

THE POWERS REGULATOR CO
Specialists in Automatic Heat Control
2718 GREENVIEW AVE., CHICAGO

NEW YORK		BOSTON
Baltimore, Md.	El Paso, Tex.	Pittsburg, Pa.
Buffalo, N. Y.	Indianapolis, Ind.	Portland, Ore.
Butte, Mont.	Kansas City, Mo.	Rochester, N. Y.
Charlotte, N. C.	Los Angeles, Cal.	St. Louis, Mo.
Cincinnati, O.	Milwaukee, Wis.	Salt Lake City, Utah
Cleveland, O.	Minneapolis, Minn.	San Francisco, Cal.
Des Moines, Ia.	New Orleans, La.	Seattle, Wash.
Detroit, Mich.	Philadelphia, Pa.	

THE CANADIAN POWERS REGULATOR CO., LTD.
TORONTO, ONT.

Calgary, Alta. Halifax, N. S. Montreal, Quebec
Vancouver, B. C. Winnipeg, Man.

(1861)

Banner Rock Wool Jacket

100% Fireproof

Hot Surface Insulation

PURDUE UNIVERSITY at Lafayette, Indiana, made tests to determine relative transmission of various Heat Insulations. The results obtained are as follows:

Material	Heat Loss in BTU's per sq. ft. per deg. difference, per 24 hrs.
1" Rock Wool Jacket	4.886
1" Hair Felt	5.340
1" Rock Cork	5.623
1" 85% Magnesia	6.842
1" Asbestos Sponge Felt	7.104

Is Not Our "Jacket" Worth Investigating?

BANNER ROCK PRODUCTS CO., Alexandria, Ind.

QUALITY HEAT AND COLD INSULATION

DEPENDABILITY!

SYNONYMOUS WITH STANDARD "Metallic" THERMOMETERS

DURABLE
DEPENDABLE
EASY TO READ
PRACTICALLY INDESTRUCTIBLE
SENSITIVE TO CHANGING TEMPERATURES

WARRANTED ACCURATE

Standard "Metallic" Thermometers are built for long and reliable service—backed by our experience of nearly forty years as Thermometer Manufacturers—made in INDICATING or RECORDING type, with ANGLE or STRAIGHT STEM. Write us about your requirements or send for descriptive booklet. We have a variety of sizes and models from which you can select your STANDARD "Metallic" THERMOMETERS.

STANDARD THERMOMETER CO.

Clifton St., Boston 19, Mass.

Nearly Forty Years as Thermometer Manufacturers

LOWERING THE PRICE

OF STEAM FITTINC
BY USING

CHITT ADJUSTABLE RADIATOR HANGERS

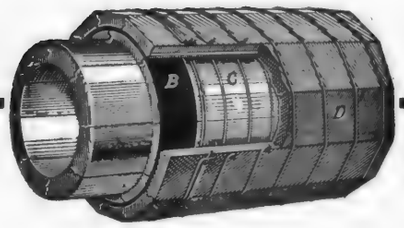
THEY SAVE YOU TIME
MONEY AND LABOR

WRITE FOR CIRCULAR
AND PRICES

HEATING SPECIALTY CO.

1232 HALL AVE., LAKEWOOD
CLEVELAND, OHIO

PATENTED PATENTED



A—Inner Shell, 2 inches thick.
B—Asphaltum Packing.
C—Dead Air Space.
D—Outer Shell, 1 inch thick.

Cover Your Steam Pipes with

Wyckoff's
Improved
Cypress Covering

Not affected by wet and dry conditions common to steam-pipe trenches. Will not rot. Absolutely water and steam tight. Each shell is wound with extra-heavy steel wire. Coated all over with the best known preservative—**Montezuma Asphalt.**

Write for catalog

A. WYCKOFF & SON CO.
ELMIRA, N. Y.

BAILEY METERS

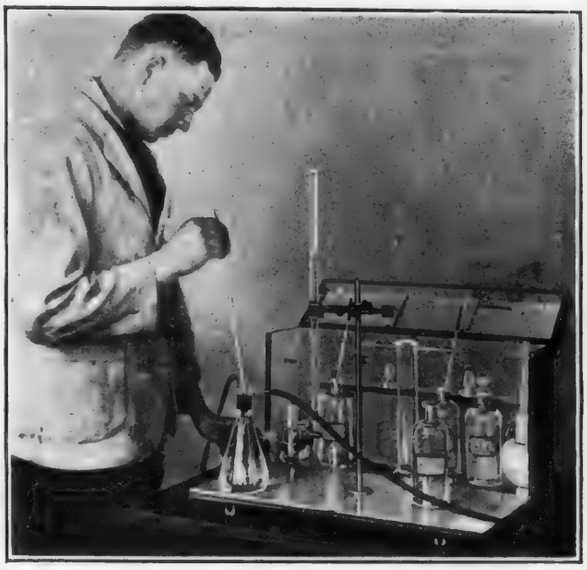
BAILEY FLUID METERS record and totalize the flow of steam at any pressure or temperature, boiler feed, condensate, circulating water, or, practically any fluid flowing in a pipe. These meters are ideal for the measurement of low pressure steam as used for heating, because pressure and temperature records may be included on the same chart, giving the complete story of the steam supply. This makes it possible to calculate the actual B. T. U. supplied to a customer, and is conclusive evidence in case of any question regarding the supply. The pressure compensator has been in service for some little time. This device automatically corrects the totalizer readings for pressure changes, so that actual steam flow may be read directly from the meter.

BAILEY BOILER METERS accomplish more real results toward obtaining maximum efficiency and capacity from boiler operation than all other meters or instruments combined, because they record rate of Steam Flow from the boiler, the Rate of Air Flow through the furnace, and the Flue Gas Temperature on a single uniformly graduated chart. The Steam Flow shows the rate of steam production. The Air Flow shows the amount of air supplied for the support of combustion. The relation between these two records shows an excess or a deficiency of air supplied for the support of combustion. The Flue Gas Temperature is a sure indication of the condition of baffles and heating surface when considered in conjunction with the other records. Wind Box Pressure and Stoker Speed as well as a totalizer for the Steam Flow may be added.

BAILEY WEIR METERS record and totalize flow of water or other liquids through V-Notch weir and are used for feed water, hot well discharge or other fluids at or near atmospheric pressure.

Other Types of Meters as well as Recording and Indicating Gauges are made for different purposes, and nearly any problem in connection with the metering of fluids can be handled. Descriptive Bulletins sent on request.

BAILEY METER COMPANY
2037-E 46th ST. CLEVELAND, OHIO



Testing water for dissolved oxygen

DISSOLVED air or oxygen in water is responsible for the corrosion or rusting away of piping, especially hot water piping. Naturally the more oxygen contained in the water, the greater the corrosion effect.

The Elliott Deaeration Process, by approximately complete removal of dissolved air and oxygen, renders corrosion in piping practically impossible.

In order that the purchaser of an Elliott Deaerator may be able to check up on oxygen removal, a portable test kit is furnished with each installation. This kit, illustrated in use above, is practically a miniature chemical laboratory with sufficient apparatus to perform a dissolved oxygen determination on water by the Winkler method. The method is accurate and so simple that it may be performed by anyone.

The prevention of corrosion in piping is eminently worth while. Let us go into the subject with you and see if we can't show you that an Elliott Deaerator is an investment in piping insurance that you cannot afford to overlook.

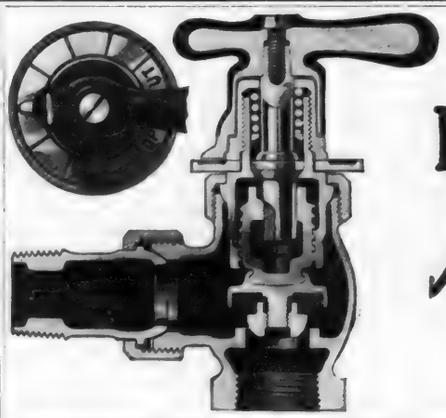
Elliott Company
Pittsburgh, Pa.

General Sales Office: Fourth St., Jeannette, Pa

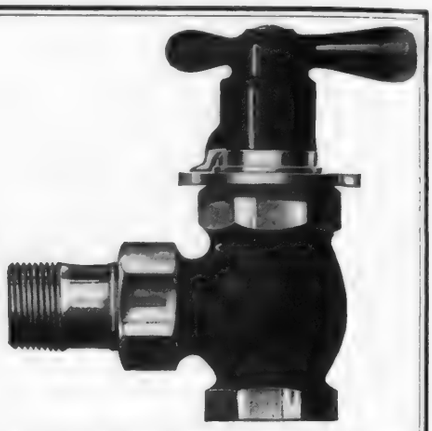
District Offices: New York, Chicago, Philadelphia, Boston Cleveland, Cincinnati, Detroit, St. Louis, Kansas City Pittsburgh, Syracuse

N-762

ELLIOTT
De-aer-ated water can't rust
Deaerator



MARSH
RE-ENFORCED MODULATED
VALVES



SOMETHING ENTIRELY NEW!

Nothing like it in Modulation valve handle construction, giving the same seating force in closing valve and smoothness of operation as with a wood wheel, completely doing away with side strain and necessity of having to reach over or around valve to operate same.

Catalogues, Lists and Discounts on Application

MARSH VALVE COMPANY, DUNKIRK, N. Y.

By Repute "Always" Reliable

Mason Reducing Valves have an extraordinary reputation for three things—long life, continuous service and reliability, which is, after all, only a natural tribute earned through merit.

MASON REDUCING VALVES

are made in many types and sizes, and every type and every size can be depended upon to reduce and maintain pressure at the proper delivery point, regardless of the fluctuation in the initial pressure.

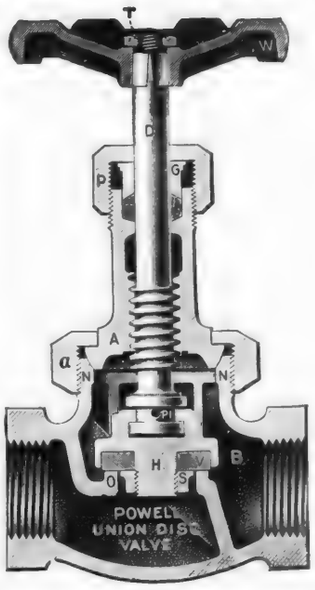
To make your assurance doubly sure, Mason service is never separated from Mason products.

If pressure regulation problems trouble you, make use of our service.

MASON REGULATOR COMPANY

Boston, Mass. San Francisco, Cal. Montreal, Canada

POWELL VALVES



UNION COMPOSITE DISC VALVES

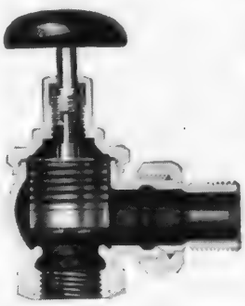
ALWAYS DEPENDABLE

For Hot Water or Steam Heating

Notice the Union Bonnet Connection

Ask your dealer for Powell Valves

The Wm. Powell Company
Cincinnati, Ohio



"One-Turn" Wheel Handle Packless Valve

Constructed with built-up bellows just like the Dunham Lever Handle Type. It can be opened or closed with approximately one turn of the handle. Effective for steam type or hot water type radiators and top or bottom connection. Absolutely leak proof.

An important addition to the valve family that will have as great a vogue as the Dunham Lever Handle Type. Write for additional data.

C. A. DUNHAM COMPANY
230 East Ohio Street, Chicago
52 Branch and Local Sales Offices in United States and Canada
Foreign sales offices in London and Paris

The DUNHAM HEATING SERVICE REG. TRADE MARK

CAPITOL PACKLESS QUICK OPENING VALVES

Have opposing seats.

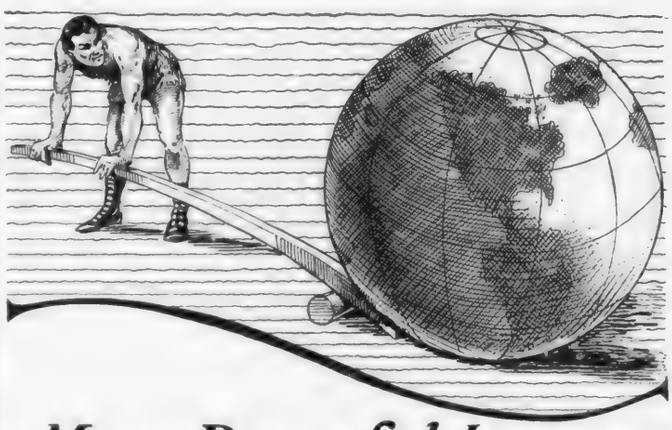
Can be used on either pressure or vacuum systems.

Perfect in every detail.

CAPITOL PRODUCTS ALWAYS SATISFY.

Write for catalog and prices.

CAPITOL BRASS WORKS
Detroit, Mich.



More Powerful Leverage Operates a Larger Valve

It was Archimedes, the Greek scientist, who said that you could lift the earth if you had a long enough lever.

It is the application of this principle that has enabled us to lift a larger, heavier float and thereby operate a discharge valve as large as the pipe connection hole in an

AMERICAN IDEAL STEAM TRAP

The 16 to 1 leverage of the American Ideal is greater than that of any other trap.

Don't select a trap by the size of the pipe connection. In some traps the pipe connection is *thirty-six times greater than the discharge!* Naturally, it is impossible for such traps to take care of the condensate under severe conditions. And you need a larger, more expensive trap of that type than of the American Ideal.

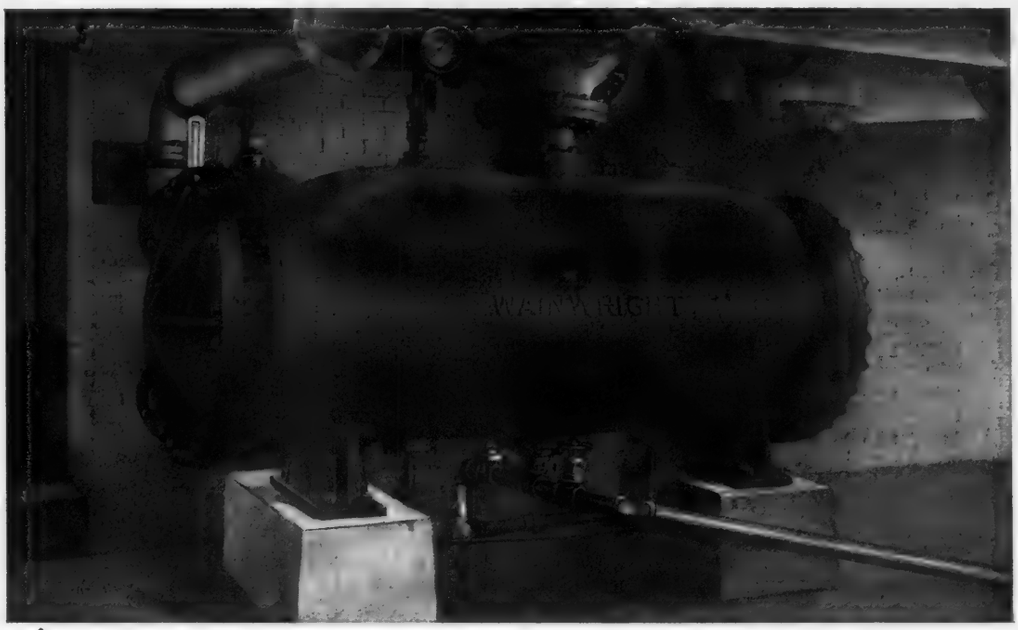
The American Ideal assures a free, continuous discharge without backing-up.

Other features, like the heavy Hercules float made of seamless, non-corroding copper, the reversible and renewable phosphor bronze seat, and the water-sealed valve, make the American the most efficient and durable as well as the cheapest trap on the market.

A copy of our interesting book "A Steam Trap Catechism" sent on request.

The Schaeffer & Budenberg Mfg. Co.
AND
American Steam Gauge & Valve Mfg. Co. Division
Boston, Mass.
Atlanta Baltimore Buffalo
Boston Chicago Detroit
Los Angeles New Orleans
Philadelphia Pittsburgh

HEATING SYSTEM HEATERS

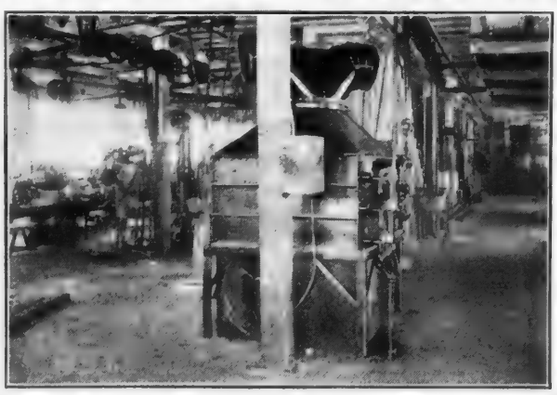


ALBERGER PUMP & CONDENSER COMPANY

140 Cedar Street, New York

Boston Chicago St. Louis Kansas City Philadelphia

HEATING A BUILDING WITH TWO RADIATORS



(140" long—75" wide—14"high)

The fact that the radiators are in

WING-SCRUPLEX REG. U.S. PAT. OFF. ***UNIT HEATERS***

makes this possible.

More heat — better heat — just where wanted—and at less cost.

Wing-Scruplex Unit Heaters run through the entire heating season without relubricating or other attention.

L. J. Wing Mfg. Co.

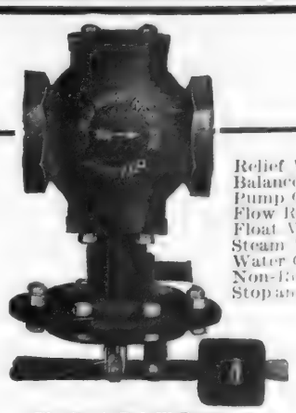
Fans and Blowers Unit Heaters
Small Turbines Damper Regulators
9TH AVE. & HUDSON ST., NEW YORK CITY

Why experiment—*when others have done the experimenting for you?*

WHY gamble? Why accept a substitute —an untried valve specialty—when can you get a device backed by almost a half century of dependable service.

For forty years engineers have been testing the Davis Pressure Regulator for you. In service, it has shown that it will unfailingly reduce a high steam pressure to any required lower pressure and maintain the reduced pressure constant. It is famous for dependable service in heating plants.

Neither do you experiment when you buy any of the Davis Valve Specialties listed opposite. The experimenting has been *done* for you. Write to G. M. Davis Regulator Co., 436 Milwaukee Ave., Chicago.

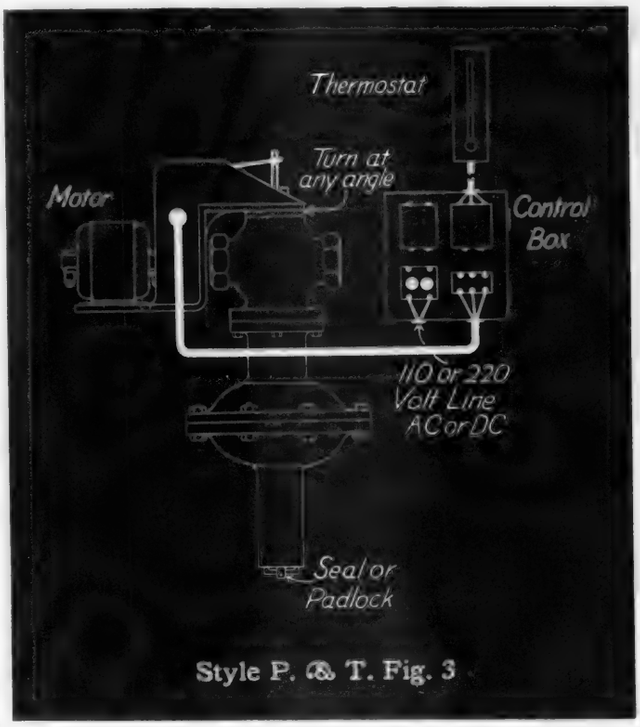


The Davis P & W Regulator —famous in heating service.

Relief Valves
Balanced Valve
Pump Governor
Flow Regulator
Float Valve
Steam Trap
Water Control Valve
Non-Return Valve
Stop and Check Valve

DAVIS VALVE SPECIALTIES
STEAM SAVERS SINCE 1875

HORNUNG PRESSURE and TEMPERATURE CONTROL VALVES



Style P. & T. Fig. 3

MASTER CONTROL

The MASTER CONTROL was designed, and is especially adapted, for control of steam heat as served from a Central Heating Plant.

The MASTER CONTROL is a combination of two valves in one, in which the lower diaphragm operates to control the pressures while the motor mounted on top of the valve operates to close off the steam when no heat is required in the building.

These valves are made interchangeable so that the MOTOR DRIVEN TEMPERATURE CONTROL may be attached to the PRESSURE CONTROL at any time.

The temperature control is also furnished without the pressure control diaphragm.

The MASTER CONTROL valve has been in use for twelve years and the saving it brings to the customer is clearly a matter of record.

A 30% reduction in the meter bill is a conservative average.

CENTRAL HEAT APPLIANCES

343 South Dearborn Street — J. C. HORNUNG — CHICAGO, ILL.

$34.20 COMPLETE

Price is net.

Sold with an absolute guarantee.

We also make a regulator for higher pressures. Also, Reducing Valves; Pump Governors; etc.

Ask for Junior Catalog No. 21

VICTOR Damper Regulator

For Boiler pressures up to 25 pounds.

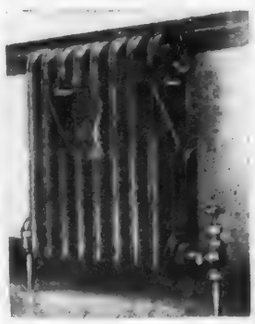
ATLAS VALVE COMPANY

REGULATING VALVES FOR EVERY SERVICE

281 South Street Newark, N. J.

HARTMANN

RADIATOR BRACKETS



WHY ?

LABOR SAVED
NO WALL STRIPS
NO BREAKAGE
NO DIRT
INEXPENSIVE

Send for descriptive circular

CHARLES HARTMANN CO.

Sheet Metal Constructors

985 Dean St., Brooklyn, N.Y.

Vento Return Line Valve

for Vacuum and Vapor Heating Systems is a fuel-saver from the moment that it is put to work on the heating system. It never fails in its promise to make the heating system give dollar-for-dollar service for every ounce of fuel consumed. Our latest Booklet, "The Perfect Heating System," will be mailed on request to any heating engineer.

WM. S. HAINES & COMPANY

PHILADELPHIA

Steam Traps — Steam Separators — Oil Separators — Strainers

Air Traps — Exhaust Heads — Boiler Alarm Water Columns

WRIGHT — WA Standard with STEAM USERS SINCE '94 — **AUSTIN**

WRIGHT-AUSTIN CO. — DETROIT, MICHIGAN

A high grade thermostatic return trap

with the non-corrosive ball check feature

How it operates:

The non-corrosive ball-check operates on a smooth guide or track, and is rolled to its seat against vapor or steam by the expansion of gas in the thermal member. When the radiator supply valves are closed, condensation of the steam forms a vacuum in the radiators which holds the balls to their seats, permitting all water in the return lines to flow freely back to the boiler, thereby eliminating the danger of broken boiler sections and preventing steam or vapor short-circuiting into radiators through return risers.

Boiler Insurance

The O-E Combination Ball-Check Trap is the only trap made with the check feature, and it osts no more than an ordinary return trap. Engineers and Architects will specify "O-E" No. 2 as insurance against boiler domage, this insurance alone being worth more than the reasonable price asked.

O-E Specialty Manufacturing Co.

Manufacturers of the

Celebrated "O-E 3-in-1" Heating Specialties

MILWAUKEE, WISCONSIN

TRADE MARK STERLCO

The Sterling Slide Valve Return Trap

Patent applied for

Will thoroughly drain return lines of heating systems, eliminate air without loss of vapor and return water to the boiler against pressure.

It will lift liquids to a higher level where steam or air pressure is available.

It can be placed as low as 3 inches above the water line of the boiler, thus making it possible to install vapor systems in basements with low ceilings.

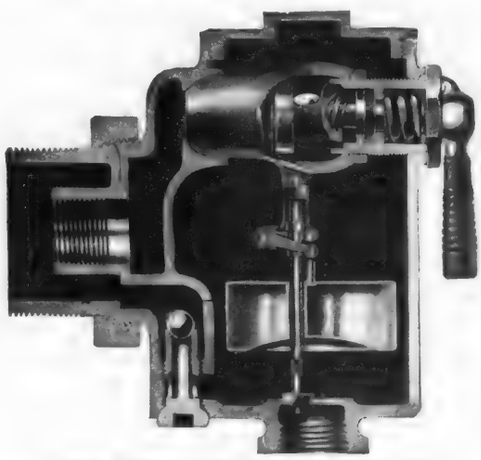
A cure for sick Vapor Heating Jobs

STERLING ENGINEERING CO.

419 Third Street MILWAUKEE WISCONSIN

IT'S DIFFERENT

Make Us Prove It



Cross Section of the Vacuum, Vapor and Low Pressure Dual Valve.

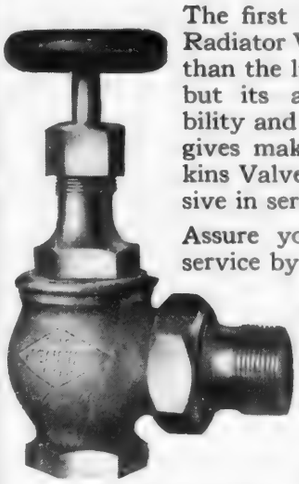
1. The Dual Valve permits no steam to enter return pipe.
2. Free air exit at all times regardless of the position of return valve.
3. Requires no eccentric or other bushings.
4. The Dual Valve replaces both the ordinary trap and graduated supply valve.
5. The operation is controlled by condensation—a natural element.
6. *The Dual Valve is the absolute elimination of all trap troubles.*

Heating and Power Appliance Company

Milwaukee, Wisconsin

TRADE JENKINS MARK
Jenkins Bros.

ECONOMY



The first cost of a Jenkins Radiator Valve may be more than the light weight valve, but its absolute dependability and the satisfaction it gives make a genuine Jenkins Valve the least expensive in service.

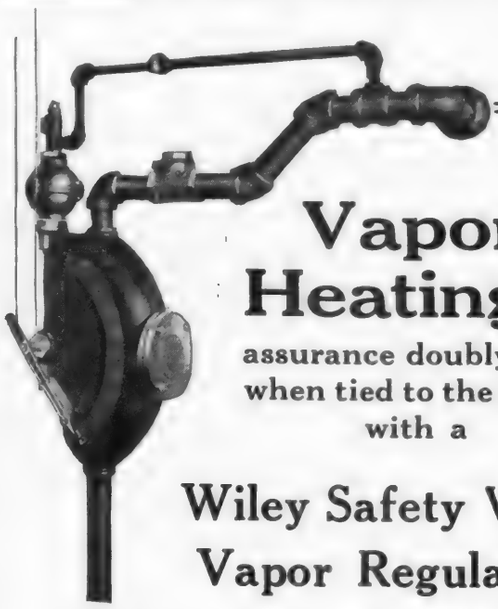
Assure yourself of Jenkins service by demanding genuine Jenkins Valves, those carrying the Jenkins "Diamond" and signature.

Fig. 168, Jenkins Standard Brass Angle Radiator Valve, with wood wheel and union.

JENKINS BROS.

New York	Boston
Philadelphia	Chicago
Montreal	London

Jenkins Valves
SINCE 1864



Vapor Heating

assurance doubly sure when tied to the boiler with a

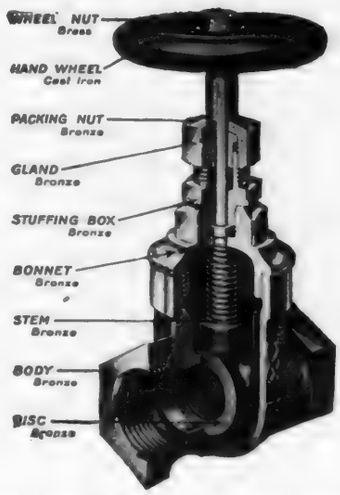
Wiley Safety Vent Vapor Regulator

Write for your copy of booklet describing the Wiley line of vapor heating specialties.

peerless quality product manufactured and sold exclusively by

The Simplex Heating Specialty Co., Inc.
Lynchburg, Va.

Read these Features of KENNEDY Bronze Valves



1. Wheel is held on by a nut, a much better construction than merely peening over the end of the stem. The Kennedy method permits the wheel to be lined up properly, eliminates the danger of losing the wheel during transit, and makes removal of the wheel possible and easy in service. Repacking a valve is much easier with the wheel removed.

2. Stem of special bronze of very high tensile and torsional strength.

3. Gland in stuffing box—an optional feature at slight additional cost, which keeps the packing nut from turning with the stem, avoids frequent repacking and makes the packing do good work until it is almost entirely used up.

4. Bonnet has a hexagonal shaped nut, which costs us more, but is much more satisfactory than a square wrench hold.

5. Body is semi-spherical or well-rounded which in comparison with a sharp cornered body, is the strongest obtainable with a given weight of metal.

6. Reinforcing ribs stiffen the body to withstand piping and service strains.

7. Pipe threads are of generous length. Short pipe threads mean that if a pipe is screwed in a little more than the average, it may press against the seat and the resulting distortion will promote leakage.

8. Discs are made solid in 3-in. and smaller sizes and double discs of three different styles are used in the larger sizes. This gives a proper choice for every service condition.

9. The discs of the double disc types cannot be replaced wrongly. Just because you have been lucky enough to escape trouble from valve discs replaced wrongly, don't get the idea that it can't happen or that it is unimportant.

10. Accurate guides for seat prevent contact of disc with seat until the valve is ready to close.

A satisfactory and permanent solution to the problem of good service from bronze valves depends largely upon your starting with the right valves. The selection of Kennedys assures good service. Write for the Kennedy Catalog to help you make a selection for trial.

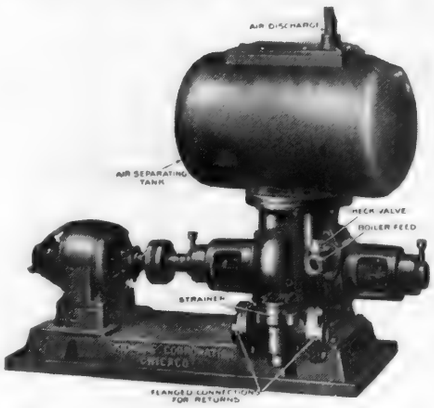
MEMBERS THE NATIONAL TRADE EXTENSION BUREAU OF THE PLUMBING AND HEATING INDUSTRY. PERMIT No. 7 REGISTERED

Have you the new Kennedy Catalog on Malleable Iron Pipe Fittings? Send for a copy.

K V THE KENNEDY VALVE MFG. CO. ELMIRA, N.Y. K V

Branch Offices and Warehouses:
NEW YORK: 95 John St. BOSTON: 47 India St.
SAN FRANCISCO: 23-25 Minna St. CHICAGO: 228 N. Jefferson St.
EXPORT OFFICE: 95 John St., New York City.
SALES OFFICES:
Seattle, L. C. Smith Bldg. Salt Lake City, 503 Dooley Bldg.
El Paso, 704 Two Republics Bldg.

SKIDMORE HYDRO TURBINE VACUUM AND BOILER FEED PUMP



Set Them as They Come

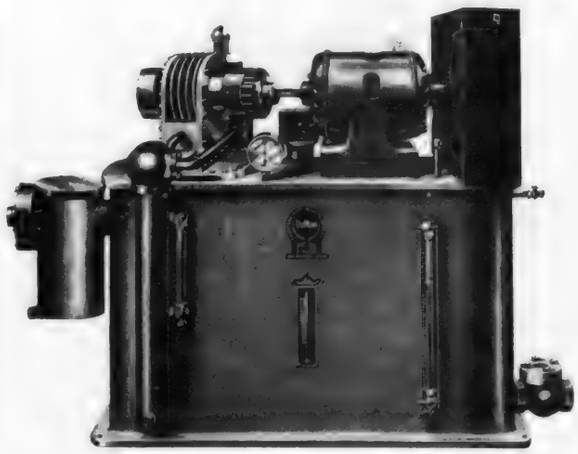
Connect up returns, wire motor and run.
Constant efficiency.
Simple design.
Low power consumption.
Bronze fitted throughout.
Minimum floor space.
Large capacity.
Return connections are close to floor.
No loss of feed water due to over flowing.
Only one moving part.
Shaft carried on heavy ball bearings.
A self contained unit all on one base.
The newest and simplest device for use on a vacuum heating system.
As there are no close clearances, this pump will maintain its original high efficiency indefinately.

Write for Bulletin No. 1

Built in five sizes for 10 and 20 lbs. pressure, to handle 8000, 16000, 26000, 40000, and 65000 sq. ft. of radiation, for continuous service or with automatic control.

SKIDMORE CORPORATION

General Offices and Factory
1535 Dayton St. CHICAGO, U. S. A.



Look up this new pump before you start your next job—

—It saves half the power

—because it is built on an entirely new principle. Instead of pumping hot water from the system back into the boiler, it creates a vacuum on a tank. Then the motor stops until the tank fills — then automatically reverses, puts the tank under pressure and forces the water back into the boilers.

No hot water touches the working parts. They are freed from the destroying corrosive action of hot water. Repairs are reduced. The life of the pump is tremendously increased.

Write for Bulletin 27—with complete explanation of the mechanical principles of this new pump and the practical advantages, and detailed specifications of sizes, prices, etc.

Thompson's Du Moin Vacuum Return Line Pump

Thompson Manufacturing Co.

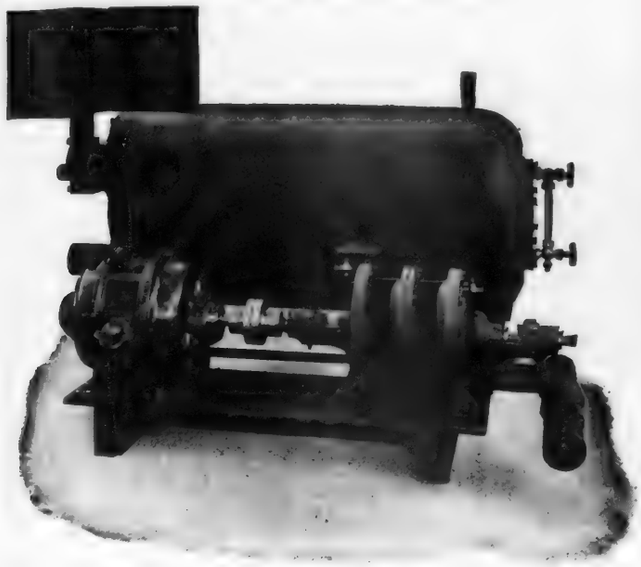
813 Twenty-fourth St., Des Moines, Ia.

YEOMANS

ELECTRICALLY OPERATED

CONDENSATION RETURN PUMPS

HORIZONTAL AND VERTICAL



SPECIAL TYPE H HIGH PRESSURE UNIT

RUGGED **RELIABLE**

Constructed to insure long life.

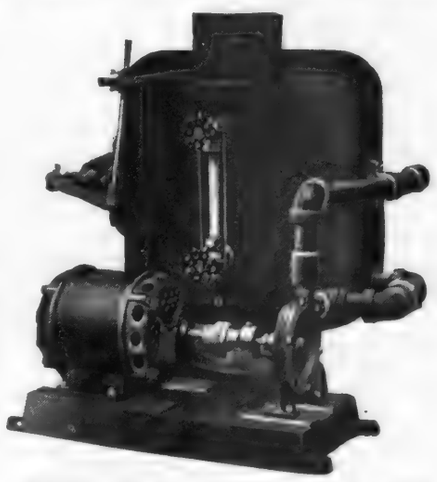
Superiority proven by years of experience.

Send for Bulletin C-5100

YEOMANS BROTHERS CO., 1421 Dayton St., Chicago, Ill.

Canadian Representatives Darling Bros., Ltd., Montreal

WESTERN AUTOMATIC ELECTRIC CONDENSATION PUMP and RECEIVERS



RELIABLE **SIMPLE**

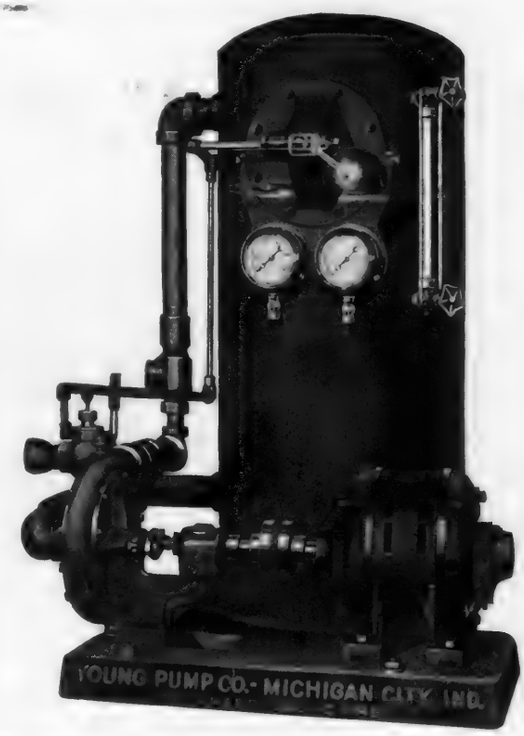
A single stage pump suitable for high or low pressure ranging from 10 lbs. to 100 lbs.

The unit is very compact, mounted on cast iron base, only two pipe connections necessary when installing. The receiver is made in two sizes, of heavy cast iron. An enclosed butt contact switch is used on all pumps.

Write for Bulletin No. 220

WESTERN ENGINEERING CO.

DAVENPORT, IOWA



They Come This Way!

JUST as you see the "YVM" outfit in the above illustration—that is the way the Young Centrifugal Vacuum and Boiler Feed Outfits are shipped. *Complete in every detail!* When received on the job, it is only necessary to make pipe connection to the system and boiler and wire connection to the motor. Then all is ready for operation.

The "YVM" is the simplest outfit made. There are no valves, springs or other parts that require adjustment, wear out or cause repair expense. It has a very low maintenance cost—in fact, the outfit is *economical in every way.*

Made in six sizes to handle 4,000, 8,000, 16,000, 26,000, 40,000 or 65,000 sq. ft. of radiation; for continuous operation or automatic control, to meet any condition or pressure.

Young Pump Company

Michigan City **Indiana**

Chicago Office, 327 S. Lasalle St.

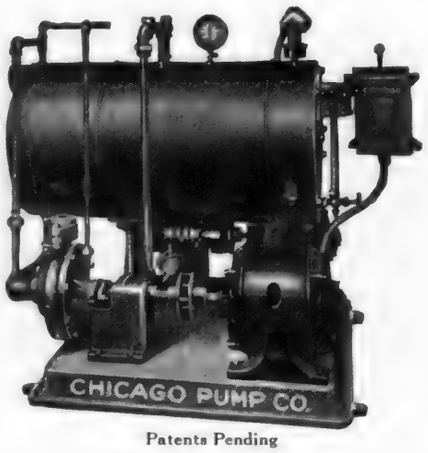
CONDO-VAC RETURN LINE PUMP

CONDENSATION-VACUUM PUMP

A return line vacuum pump, like any other pump, is designed for efficiency and economy. A pump that is wasteful or one that is constantly in need of repair is money and time lost.

Our Condo-Vac return line pump is designed and made of such materials that it will stand up under the most distressing and unusual circumstances as well as under easy operation terms.

True efficiency in a Return Line Vacuum pump can be obtained only with a CONDO-VAC because—air and water are handled by separate pumps, each driven by its own motor and each controlled independently, eliminating the waste in electricity and wear on machinery.



Patents Pending

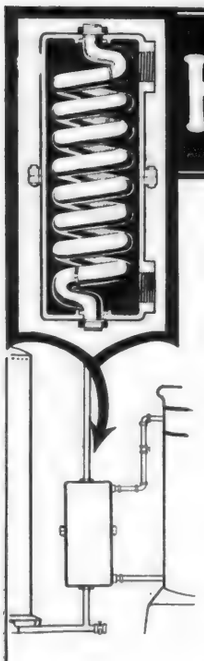
Each pump operates only when there is actual need of its services.

Since air and vapor are approximately four-fifths of the volume handled, there is no need of running the water pump four-fifths of the time unnecessarily. These are some of the many reasons which makes the CONDO-VAC especially desirable.

THE ABOVE ADVANTAGES OF THIS PUMP ARE BUT A FEW OF THEM. SEND FOR BULLETIN 45 AND SEE THE OTHER ADVANTAGES FOR YOURSELF.

CHICAGO PUMP COMPANY

2325 WOLFRAM STREET CHICAGO, ILLINOIS



PLENTY OF
HOT WATER
NO EXTRA EXPENSE

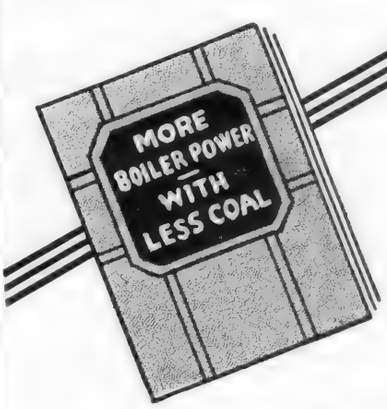
The most approved and economical method of heating water for domestic purposes. An abundant supply of hot water at just the right temperature, 24 hours a day, at practically no extra cost. Easily connected to outside of steam, vapor or hot water boiler; does away with fuel-wasting coil in fire pot, uses surplus heat of boiler. Does not overheat or underheat. Will not burn out, once installed.

An unusual opportunity for live dealers. Order now and be prepared for the demand being created. We furnish cooperation and practical sale helps to give you full benefit of our national advertising. Write for full details.

The Hotstream Heater Co.
"Makers of Heaters that Heat"
Cleveland, Ohio

The **Hotstream**
INDIRECT WATER HEATER

We also make a complete line of Gas and Kerosene Water Heaters.



Got Your Copy Yet?

—it's worth while having!

THIS book enables you to judge any power plant in direct comparison with the economical, efficient and flexible

Twin-Fire
HAND STOKER
"It Burns the Smoke"

Explains fully the principles of construction which effect *elimination of smoke*, fuel saving of 10-30% over the ordinary setting, increased boiler power and the construction which allows the efficient combustion of *any grade of fuel*. Full of tinted charts, figures and *facts* from cover to cover.

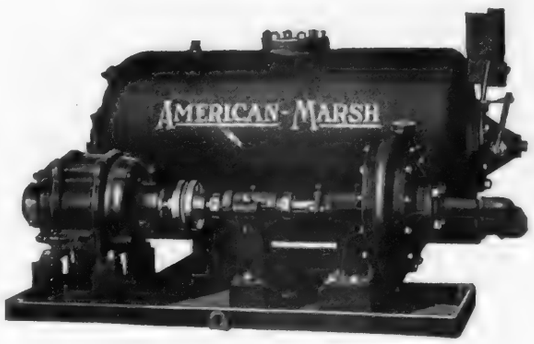
Reserve YOUR copy by writing NOW. Address

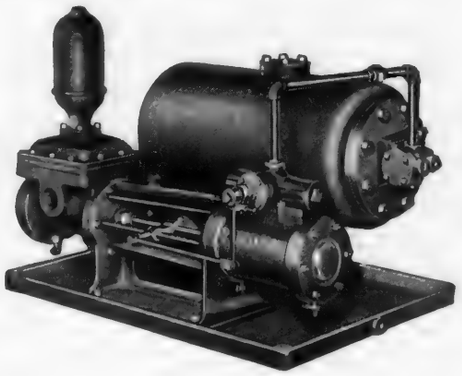
TWIN-FIRE FURNACE COMPANY
1251 First Nat'l Bank Bldg. CHICAGO

"Successful Furnace Builders Since 1895"

American-Marsh Condensation Pumps

Direct Acting and Centrifugal





American-Marsh Condensation Pumps are the result of over thirty-five years experience in the manufacture of high grade pumps for heating systems. They are built in the motor driven centrifugal type in both horizontal and vertical patterns, the vertical type being intended for use where the returns are laid on or under the basement floor.

The steam driven pattern is equipped with the well known American-Marsh steam valve, the same as used on American-Marsh Vacuum Pumps. With this type of valve the pump positively cannot short-stroke or race. Steam pumps can be furnished to operate on steam pressures as low as 10 pounds. On pressures lower than this the motor driven type is recommended.

May we send you our interesting booklet covering pumps for heating systems?

AMERICAN STEAM PUMP COMPANY, Battle Creek, Mich.

Full Complement of Building Pumping Units

Automatic, Centrifugal, Vacuum and Boiler Feed Pumps

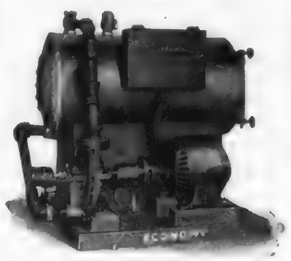
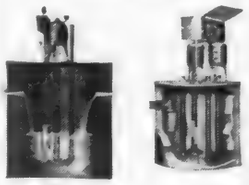


Fig. 2234

Capacities, 2500 to 65000 square feet direct radiation per standard single units.

Self Contained
High Class—Dependable

Cellar Drainers, Bilge and Sump Pumps, Sewage Ejectors



Duplex Single

Capacities, 7 to 3000 gallons per minute.

Duplex Units, Double Capacity

Made in several types and specially designed to meet all conditions.

Automatic Condensation Pumps and Receivers

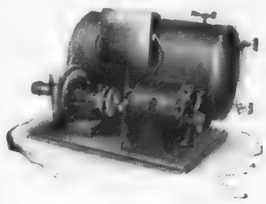
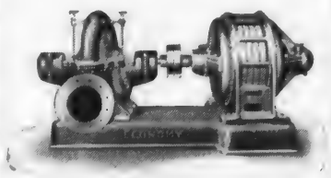


Fig. 2176

Capacities, 1000 to 125000 square feet

Made in following types: Horizontal, Vertical, and Underground. Also Piston types for extreme pressures.

Centrifugal Pumps for all purposes



Made either Single or Multi-stage

Boiler Feed house device. Hot water heating and Ice water circulating pumps.

All capacities and pressure from 5 to 5000 gallons per unit.

PERFORMANCE GUARANTEES

ECONOMY PUMPING MACHINERY CO.

122-124 N. Curtis St. Chicago, Illinois.

ENGINEERS' SPECIFICATION INDEX

AIR COMPRESSORS.
Nash Engineering Co., So. Norwalk, Conn.

AIR CONDITIONING APPARATUS.
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corporation, Philadelphia, Pa.
Buckeye Blower Co., Columbus, O.
Carrier Engineering Corporation, New York.
Clarage Fan Co., Kalamazoo, Mich.
W. L. Fleischer Co., New York, N. Y.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

AIR COOLING AND DRYING SYSTEMS.
Atmospheric Conditioning Corp., Phila., Pa.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, New York.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower, Inc., New York.
W. L. Fleisher Co., New York, N. Y.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, Jas. M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

AIR ELIMINATORS.
Jas. P. Marsh & Co., Chicago, Ill.

AIR SEPARATORS.
Griscom-Russell Co., New York.
Hoffman Specialty Co., New York.

AIR WASHERS.
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corp., Phila, Pa.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, New York.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower, Inc., New York.
W. L. Fleisher Co., New York, N. Y.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

AUTOMATIC SPRINKLERS
Grinnell Co., Inc., Providence, R. I.

BLOWERS.
Fan.
American Blower Co., Detroit Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Porbeck Mfg. Co., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.
Pressure.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.
Rotary.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg Co., New York.
Turbine.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

BOILER BREECHINGS.
Hartmann Co., Charles, Brooklyn, N. Y.

BOILERS.
Copper.
Dahlquist Mfg. Co., Boston, Mass.
Down-Draft.
American Radiator Co., Chicago, Ill.
The Brownell Co., Dayton, O.
Chicago Down Draft Furnace Co., Chicago, Ill.
Herbert Boiler Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Heating.
Advance Boiler Corp., New York.
American Radiator Co., Chicago, Ill.
The Brownell Co., Dayton, O.
Central Radiator Co., New York.
Cox, Abram Stove Co., New York.
Gorton & Lidgerwood Co., New York.
Gurney Heater Mfg. Co., Boston, Mass.
Herbert Boiler Co., Chicago, Ill.
Illinois Malleable Iron Co. Chicago, Ill.
International Heater Co., Utica, N. Y.
Kewanee Boiler Co., Kewanee, Ill.
Oil City Boiler Works, Oil City, Pa.
Page Boiler Co., New York.
Pierce, Butler & Pierce, New York.
Titusville Iron Works Co., Titusville, Pa.
Utica Heater Co., Utica, N. Y.
Oil Burning
Breese Engineering, Inc., Chicago, Ill.
Power.
Kewanee Boiler Co., Kewanee, Ill.
Oil City Boiler Works, Oil City, Pa.
Titusville Iron Works Co., Titusville, Pa.

CALORIMETERS.
Sarco Co., New York.
Schaefer & Budenberg Mfg. Co., Brooklyn, N. Y.

COILS, PIPE.
Buckeye Blower Co., Columbus, O.
Simmons Co., John, New York.
Air.
New York Blower Co., Chicago, Ill.

COOLERS.
Oil.
Griscom-Russell Co., New York.

CONDENSERS.
Alberger Heater Co., Buffalo, New York.
Alberger Pump & Condenser Co., New York.
American Radiator Co., Chicago, Ill.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Elliot Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CONVERTERS, HOT WATER.
Patterson-Kelley Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

COVERING, PIPE.
America District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
National Asbestos Mfg. Co., Jersey City, N. J.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son Co., A., Elmira, N. Y.

DAMPERS, DUCT.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.

DEHUMIDIFYING APPARATUS.
Atmospheric Conditioning Corp., Phila., Pa.
Carrier Engineering Corporation, New York.
W. L. Fleisher Co., New York, N. Y.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DISTILLERS, (water).
Griscom-Russell Co., New York.

DRYING SYSTEMS.
(See Air Cooling and Drying Systems.)

DUST COLLECTING SYSTEMS.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, New York.
Clarage Fan Co., Kalamazoo, Mich.
Hersh Brothers Co., Allentown, Pa.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DUST COLLECTORS.
Atmospheric Conditioning Corp., Phila., Pa.
Clarage Fan Co., Kalamazoo, Mich.
Hersh Brothers Co., Allentown, Pa.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DUST DETERMINATORS.
Atmospheric Conditioning Corp., Phila., Pa.

ECONOMIZERS, FUEL.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EQUALIZING LOOPS.
Hoffman Specialty Co., New York.

EXHAUST SYSTEMS.
Buckeye Blower Co., Columbus, O.
Hartmann Co., Charles, Brooklyn, N. Y.

ENGINES.
Steam, Automatic.
American Blower Co., Detroit, Mich.
The Brownell Co., Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Steam, High Speed.
American Blower Co., Detroit, Mich.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EVAPORATORS.
Boiler Feed Make-up.
Griscom-Russell Co., New York.

EXHAUST HEADS.
Burt Mfg. Co., Akron, O.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley, Co., New York.
Simmons, Co., John, New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wright-Austin Co., Detroit, Mich.

EXPANSION JOINTS.
Alberger Heater Co., Buffalo, N. Y.
Alberger Pump & Condenser Co., New York.
American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.

FANS, EXHAUST.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo, Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, Jas. M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

FILTERS, (Aerating).
Griscom-Russell Co., New York.
Feed-water.
Elliott Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.
American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Simmons Co., John, New York.

FLANGES.
American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Jenkins Bros., N. Y.

FUEL OIL BURNERS.
Breese Engineering Inc., Chicago, Ill.
Combustion Co., Chicago, Ill.

FURNACES, WARM AIR.
Twin Fire Furnace Co., Chicago, Ill.

GASKETS, METALLIC.
Sarco Co., New York.

GAUGE BOARDS.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Bishop & Babcock Co., Cleveland, O.
McAlear Mfg. Co. Chicago, Ill.
Jas. P. Marsh & Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Webster & Co., Warren, Camden, N. J.

GAUGES.
Draft.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Jas. P. Marsh & Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Hydraulic.
Jas. P. Marsh & Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Ounce Graduated.
Jas. P. Marsh & Co., Chicago, Ill.
Pressure.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
American Dist. Steam Co., North Tonawanda, N. Y.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Webster & Co., Warren, Camden, N. J.
Vacuum.
American Steam Gauge & Valve Mfg., Co., Boston, Mass.
Bishop & Babcock Co., Cleveland, O.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Webster & Co., Warren, Camden, N. J.
Water.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
American District Steam Co., No. Tonawanda, N. Y.
Capitol Brass Works, Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.
Atmospheric Conditioning Corp., Phila., Pa.
Cooling Tower, Inc., New York.
Sturtevant Co. B. F., Hyde Park, Boston, Mass.

GENERATORS, (Heat)
Honeywell Heatng Specialties Co., Wabash, Ind.

GOVERNORS, (pump).
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

WYANDOTTE HIGH SCHOOL, WYANDOTTE, MICH.
Five S-4023 Super-Smokeless Boilers

B. C. Wetzel & Co., Architects

Drake-Avery Co., Heating Contractors

UTICA-IMPERIAL

SUPER-SMOKELESS BOILERS

Are Used Extensively for School Heating

WHERE smokeless operation and fuel economy is most essential, you can safely specify SUPER-SMOKELESS Boilers. Some of the finest schools in the United States are heated by SUPER-SMOKELESS Boilers; and their use in large buildings everywhere is rapidly increasing.

In SUPER-SMOKELESS Boilers the smoke is actually consumed as fuel, thereby eliminating the smoke problem and achieving unusual heating capacity at the same time. This clean and exceptionally efficient combustion is secured by the patented SUPER-SMOKELESS Device, which admits additional oxygen right at the heart of the fire on the principle of the Bunsen Burner.

Our special School Heating Bulletin lists and illustrates many schools throughout the country heated by SUPER-SMOKELESS Boilers. The scientific design of the Utica-Imperial SUPER-SMOKELESS Boiler is described in this interesting bulletin—Send for your copy.

UTICA HEATER COMPANY, Utica, N. Y.

Chicago:	*Cleveland:*	*New York:*
218-220 W. Kinzie St.	30 Euclid Arcade	5620 Grand Central Term'l

Representatives in Twenty-six Principal Cities

MOREY JUNIOR HIGH SCHOOL
Denver, Colo.

Fisher & Fisher
Architects

Five S-4015 SUPER-SMOKELESS BOILERS

McCarty & Johnson Heating & Engineering Co.

ENGINEERS' SPECIFICATION INDEX (Continued)

HEATERS.

(Domestic Water.)
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Dahlquist Mfg. Co., Boston, Mass.
Excelso Specialty Works, Buffalo, N. Y.
Grinnell Co., Inc., Providence, R. I.
Griscom-Russell Co., New York.
Hotstream Heater Co., Cleveland, Ohio.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Closed).
Alberger Heater Co., Buffalo, N. Y.
Alberger Pump & Condenser Co., New York.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Simmons Co., John, New York.
Sims Co., Erie, Pa.
Whitlock Coil Pipe Co., Hartford, Can.

Feed Water, (Open).
Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.
Griscom-Russell Co., New York.
American Blower Co., Detroit, Michigan.

Pipe, Coil (Air).
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

Unit.
L. J. Wing Mfg. Co.

HEATING SYSTEMS.

Gravity and Forced Circulation, Water.
Alberger Heater Co., Buffalo, N. Y.

Unit Air.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
H. W. Nelson Co., Moline, Ill.
Peerless Unit Ventilating Co., New York.

Unit Blast.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buckeye Blower Co., Columbus, O.
Ilg Electric Ventilating Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

Vacuum.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, O.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Jas. P. Marsh & Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Vapor.
American District Steam Co., No. Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat-Squires Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

HUMIDIFIERS.

American Blower Co., Detroit, Mich.
American Moistening Co., Boston, Mass.
Atmospheric Conditioning Corp., Phila., Pa.
Carrier Engineering Corporation, New York.
Grinnell Co., Inc., Providence, R. I.
W. L. Fleisher Co., New York, N. Y.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, Jas. M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

HUMIDITY CONTROL.

Atlas Valve Co., Newark, N. J.
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corp., Phila., Pa.
Carrier Engineering Corporation, New York.
W. L. Fleisher Co., New York, N. Y.
Grinnell Co., Inc., Providence, R. I.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F. Hyde Park, Boston, Mass.

HYDROMETERS.

Jas. P. Marsh & Co., Chicago, Ill.

INSTRUMENTS.

Electric Measuring.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Indicating and Recording.
Bailey Meter Co., Cleveland, O.
Jas. P. Marsh & Co., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Sarco Co., New York.
Standard Thermometer Co., Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

INSULATING MATERIALS.

American District Steam Co., No. Tonawanda, N. Y.
Banner Rock Products Co., Alexandria, Ind.
Hornung, J. C., Chicago, Ill.
National Asbestos Mfg. Co., Jersey City, N. J.
Ric-Wil Co., Cleveland, O.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.

Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Co., New York.

METERS.

Condensation.
American Dist. Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.

Feed Water.
Simmons Co., John, 110 Center St., New York.

Feed Water (Wier Type).
Webster & Co., Warren, Camden, N. J.

Pitot Tube.
American Blower Co., Detroit, Mich.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.

Steam.
American District Steam Co., No. Tonawanda, N. Y.
Bailey Meter Co., Cleveland, O.

MOTORS, (Electric).

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

PAINT, FOR HEATED SURFACES.

Ric-Wil Co., Cleveland, O.

PIPE.

Soil.
Simmons Co., John, 110 Center St., New York.

Steel.
Simmons Co., John, 110 Center St., New York.

Wrought Iron
Simmons Co., John, 110 Center St., New York.

Wood.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.

Buffalo Forge Co., Buffalo, N. Y.
Crane Co., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Simmons Co., John, 110 Center St., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING, WOOD.

American District Steam Co., No. Tonawanda, N. Y.
Wychoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.

Grinnell Co., Inc., Providence, R. I.
Jenkins Bros., New York.
Simmons Co., John, New York.

PIPE CUTTING AND THREADING MACHINES.

Crane Co., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.

PIPE, POWER.

Crane Co., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Simmons Co., John, New York.

POWER PLANT SUPPLIES.

American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Elliott Co., Jeanette, Pa.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Simmons Co., John, New York.

PUMPS.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Centrifugal.
Alberger Pump & Condenser Co., New York.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sprague Electric Works, New York.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.
American Steam Pump Co., Battle Creek, Mich.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Thompson Mfg. Co., Des Moines, Ia.
Trane Co., La Crosse, Wis.
Western Engineering Co., Davenport, Iowa.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.
Nash Engineering Co., So. Norwalk, Conn.
Thompson Mfg. Co., Des Moines, Ia.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Steam.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.
Alberger Pump & Condenser Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.
Yeomans Bros., Chicago, Ill.

Vacuum.
American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Co., Cleveland, O.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Elliott Co., Jeanette, Pa.
Hydro-High Vacuum Pump Co., Newport, Ky.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

PYROMETERS.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

RADIATOR HANGERS.

Gloeckle, Jr., A. F., Rochester, N. Y.
Hartmann Co., Chas., Brooklyn, N. Y.
Heating Specialties Co., Cleveland, O.
Healy-Ruff Co., Minneapolis, Minn.

RADIATORS, STEAM AND WATER.

American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
Simmons Co., John, New York.

RECEIVERS.

Air.
American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, O.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.
Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.
McAlear Mfg. Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.

Damper.
American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Co., Cleveland, O.
Davis Regulator Co., G. M., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
H. Mueller Mfg. Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
H. W. Nelson Co., Moline, Ill.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.

Pressure.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg., Chicago, Ill.
National Regulator Co., Chicago, Ill.

Temperature.
American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.

The Honeywell Heat Generator

is the heart of the Honeywell Hot Water Heating System, giving absolute control together with a range of temperature from 85 to 240°. Compare this remarkable flexibility with the 212° to 220° of a good steam system or the 150° to 212° of a good vapor system.

The universal success, the never disappointing years of operation of the HONEYWELL SYSTEM have proved conclusively that the theory upon which it is based is correct. An increased and positive circulation; an instantaneous heat under perfect control, quickly increased or checked; the use of smaller valves and piping, with less water to move; the sending of even heat into radiators at extreme distance from boiler; minimum amount of piping; an easy layout for the fitter and the minimum cost of installation and operation.

Tank-in-attic or Tank-in-basement layouts as desired.

Years of use and thousands installed in the United States, Canada and other countries have proved its superiority.

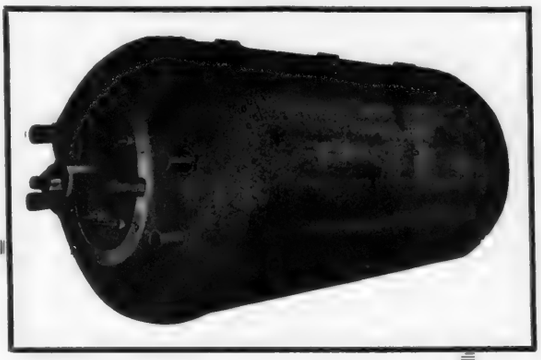
Helpful Engineering Service supplied.

Our booklet "How to Properly Design and Install the Honeywell Method of Hot Water Heating" tells the whole story and will be mailed on request.

The Honeywell Heating Specialty Co.

WABASH, INDIANA

Manufactured in Montreal for Canadian Trade



For Durability
For Service
For Economy

For Personal and Client Satisfaction

SPECIFY

Dahlquist Copper Boilers

Dahlquist Manufacturing Company
40 West 3rd St. Boston, Mass.

Carrier Engineering Corporation

Carrier AIR CONDITIONING AND DRYING EQUIPMENT

750 Frelinghuysen Ave.
NEWARK, N. J.
New York
Boston Philadelphia
Buffalo Chicago

Carrier AIR CONDITIONING AND DRYING EQUIPMENT

Air Conditioning and Drying

Humidification Dehumidification Cooling
Heating Ventilation Purification

High Temperature Air Heaters for
Drying Processing Baking
up to 1000° F.

We invite correspondence

Make "Every day a *good* day" with
MANUFACTURED WEATHER

Peerless Engineering Co.

Lock Box 859, Cincinnati, Ohio
Hydraulic Mechanical Electrical
ENGINEERS
HEATING VENTILATION
Designs, Specifications
Water Power, Water Supply
Suburban Lighting and Power

Surveying or Layouts, Grading and Leveling Up, Foundations, Retaining Walls, Millwrighting, Water Power, Water Supply, Piping all kinds, Bridges, Steel, Reinforced Concrete Tanks, Tanks and Towers, Arches, Garages, Silos, Warehouses, Factory Buildings, Farm Buildings.

GURNEY BOILERS RADIATORS

FOR HEATING ANY DESCRIPTION OF BUILDING BY STEAM OR HOT WATER

GURNEY HEATER MANUFACTURING CO.

HEAD OFFICE FORT HILL SQUARE BOSTON, MASS. SHOWROOMS NEW YORK-PHILADELPHIA

ENGINEERS' SPECIFICATION INDEX (Continued)

Bishop & Babcock Co., Cleveland, O.
Carrier Engineering Corporation, New York.
Elliott Co., Jeanette, Pa.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
McAlear Mfg. Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

SEPARATORS.

OIL.

Burt Mfg. Co., Akron, Ohio.
Elliott Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Wright-Austin Co., Detroit, Mich.

STEAM.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Co., Cleveland, O.
Crane Co., Chicago, Ill.
Elliot C., Jeanette, Pa.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SHEET METAL CONSTRUCTION.

Hartmann Co., Charles, Brooklyn, N. Y.

SPRAY COOLING SYSTEMS.

Atmospheric Conditioning Corp., Phila., Pa.
Cooling Tower, Inc., New York.
Massachusetts Blower Co., Watertown, Mass.
Seymour, Jas. M., Newark, N. J.

STRAINERS.

OIL

Burt Mfg. Co., Akron, Ohio.
Elliott Co., Jeanette, Pa.
Griscom-Russell Co., New York.

STEAM.

American Dist. Steam Co., No. Tonawanda, N. Y.
Elliott Co., Jeanette, Pa.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.

THERMOMETERS.

(Recording and Indicating.)

American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Sarco Co., New York.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Standard Thermometer Co., Boston, Mass.

WATER.

Marsh & Co., Jas. P., Chicago, Ill.

THERMOSTATS.

American Radiator Co,. Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, O.
Johnson Service Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

TRAPS.

RADIATOR.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, O.
Dole Valve Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Heating & Power Appliance Co. Milwaukee, Wis.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mouat-Squires Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

RETURN.

American Blower Co., Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jas. P. Marsh & Co., Chicago, Ill.
Mouat-Squires Co., Cleveland, O.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

STEAM.

American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Steam Gauge & Valve Mfg. Co.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Elliott Co., Jeanette, Pa.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Patterson-Kelley Co., New York.
Sarco Co., New York.
Simmons Co., John, New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., La Crosse Wis.
Wright-Austin Co., Detroit, Mich.

VACUUM.

American Blower Co., Detroit, Mich.
Bishop & Babcock Co., Cleveland, O.
Dunham Co., C. A., Chicago, Ill.
Heating & Power Appliance Co., Milwaukee, Wis.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES, (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Westinghoue Electric & Mfg. Co., East Pittsburgh, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
National Asbestos Mfg. Co., Jersey City, N. J.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son., A., Elmira, N. Y.

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Spencer Turbine Co., Hartford, Conn.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VALVES.

AIR (Automatic)

American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Dole Valve Co., Chicago, Ill.
Wm. S. Haines & Co., Philadelphia, Pa.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Russell, W. A. Co., New York.
Simmons Co., John, New York.

AIR RELIEF.

American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
The Wm. Powell Co., Cincinnati, O.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

BACK PRESSURE.

Crane Co., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Simmons Co., John, New York.

BALANCED.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.

BLOW-OFF.

Crane Co., Chicago, Ill.
Elliott Co., Jeanette, Pa.
Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.
Simmons Co., John, New York.

CHECK.

Crane Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg Co., Elmira, N. Y.
The Wm. Powell Co., Cincinnati, O.
Simmons Co., John, New York.

GATE.

American District Steam Co., No. Tonawanda, N. Y.
Capital Brass Works, Detroit, Mich.
Crane Co., Chicago, Ill.
Dole Valve Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
The Wm. Powell Co., Cincinnati, O.
Simmons Co., John, New York.

GLOBE, ANGLE AND CROSS.

Commonwealth Brass Corp., Detroit, Mich.
Crane Co., Chicago, Ill.
Dole Valve Co., Chicago, Ill.
Illinois Engineeringe Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
The Wm. Powell Co., Cincinnati, O.
Simmons Co., John, New York.

HYDRAULIC-OPERATING.

Atlas Valve Co., Newark, N. J.
Crane Co., Chicago, Ill.

NON-RETURN.

Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
The Wm. Powell Co., Cincinnati, O.
Simmons Co., John, New York.

RADIATOR.

American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, O.
Capitol Brass Works, Detroit, Mich.
Commonwealth Brass Corporation, Detroit, Mich.
Crane Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Dole Valve Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Heating & Power Appliance Co., Milwaukee, Wis.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Marsh Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
The Wm. Powell Co., Cincinnati, O.
Trane Co., La Crosse, Wis.
Simmons Co., John, New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Wilwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

REDUCING.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
The Wm. Powell Co., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

REGULATING.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
The Wm. Powell Co., Cincinnati, O.

SAFETY.

American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

STOP AND CHECK (See Valves, Non-Return.)

VENTILATING HEATERS.

American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Hersh Bros. Co., Allentown, Pa.
New York Blower Co., Chicago, Ill.
Seymour, Jas. M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Massachusetts Blower Co., Watertown, Mass.

VENTILATING SYSTEMS.

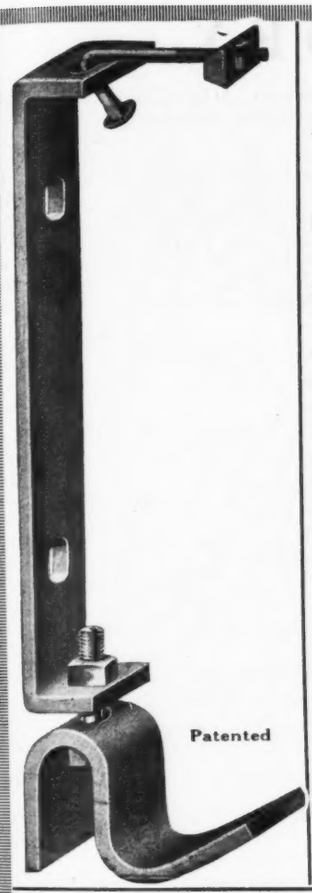
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corp., Phila., Pa.
Autovent Fan & Blower Co., Chicago, Ill.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, New York.
Clarage Fan Co., Kalamazoo, Mich.
W. L. Fleisher Co., New York, N. Y.
Garden City Fan Co., Chicago, Ill.
Hersh Bros. Co., Allentown, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
H. W. Nelson Co., Moline, Ill.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilating Co., New York.
Porbeck Mfg. Co., St. Louis, Mo.
Seymour, Jas. M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sprague Electric Works, New York.
Sturtevant Co., B. F. Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

VENTILATORS.

Allen Air-Turbine Ventilator Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Burt Mfg. Co., Akron, Ohio.
Hersh Bros. Co., Allentown, Pa.
New York Blower Co., Chicago, Ill.
Seymour, Jas. M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
L. J. Wing Mfg. Co., New York.

MUSHROOM.

Hersh Brothers Co., Allentown, Pa.
Knowles Mushroom Ventilator Co., New York.
New York Blower Co., Chicago, Ill.



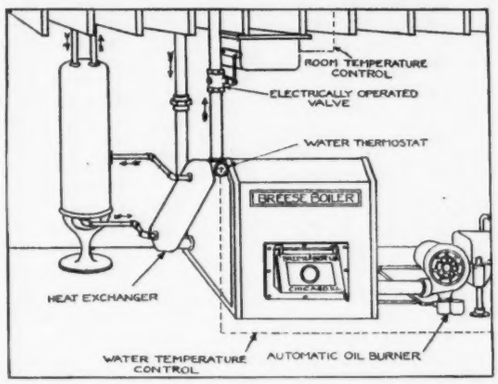
NOTICE!

A. F. Gleockle, Jr.
415 Bay St.
ROCHESTER, N. Y.

manufactures a wall radiator bracket that meets all the requirements of a wall radiator bracket and then some. The "Gleockle" bracket is of Universal adjustment, can be easily erected and fits any make of wall radiator. Made of wrought iron and dipped to prevent rusting, it is indestructible. When the question of wall radiator brackets comes up, remember that "Gleockle" is the answer.

Specifying "Gleockle" Brackets is one way of saving your client money

OIL BURNING BOILERS



FOR HOUSE HEATING

BREESE ENGINEERING INC.

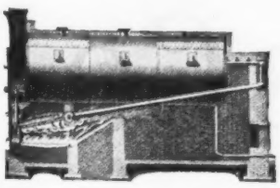
112 West Adams St., Chicago, Ill.

Manufacturers of

Breese Oil Burning Boilers and Automatic Hot Water Supply

SMOKELESS AND COAL SAVING

DOWN DRAFT FURNACES



Designed and manufactured for any make of Water Tube, Scotch Marine or Return Tubular Boilers, for high or low pressure they can be attached to old or new boilers, by any Steam Fitter or Boiler Maker, from information given on Drawings furnished by us.

With our 30 years' experience in this line, we can guarantee proper design and workmanship.

Write for further information

CHICAGO DOWN DRAFT FURNACE CO.

115-117 So. Clinton St. **CHICAGO, ILL.**

Manufacturers of the Improved Chicago Hawley Down Draft Furnaces

SOME SUBJECTS

B. T. U. Losses
Chimneys
Ducts and Flues
Fittings
Flow of Steam in Pipes
One Pipe Steam Systems
Vacuum Heating Systems
Vapor Heating Systems
Gravity Water Heating

Heating and Ventilation

STANDARD DATA SHEETS

222 Sheets Covering 25 Important Subjects
Price 5 Cents per Sheet

Send for folder giving full list and special prices on sets and binder.

HEATING AND VENTILATING MAGAZINE CO.
1123 Broadway **New York City**

GURNEY BOILERS RADIATORS

FOR HEATING ANY DESCRIPTION OF BUILDING BY STEAM OR HOT WATER

GURNEY HEATER MANUFACTURING CO.

HEAD OFFICE FORT HILL SQUARE BOSTON, MASS. **SHOWROOMS NEW YORK-PHILADELPHIA**

ADVERTISERS' INDEX

Advance Boiler Corp. 7
Alberger Heater Co. 80
Alberger Pump & Condenser Co. ... 92
Allen Air-Turbine Ventilator Co. 26
American Blower Co. 77
American District Steam Co. 14
American Radiator Co. 21, 67
American Steam Gauge & Valve Mfg. Co. 91
American Steam Pump Co. 99
Atlas Valve Co. 93
Atmospheric Conditioning Corp. ... 80
Autovent Fan & Blower Co. 73

Bailey Meter Co. 89
Banner Rock Products Co. 88
Barnes & Jones 22
Bayley Mfg. Co. 82
Bishop & Babcock Co. 20
Breese Engineering, Inc. 105
Buckeye Blower Co. 85
Buffalo Forge Co. 75
Burt Mfg. Co. 86

Capitol Brass Works 91
Carrier Engineering Corp. 103
Chicago Down Draft Furnace Co. 105
Chicago Pump Co. 98
Clarage Fan Co. 2
Combustion Co. 11
Commonwealth Brass Corp. 16
Cooling Tower, Inc. 84
Cox, Abram Stove Co. 9
Crane Co. 17

Dahlquist Mfg. Co. 103
Davis Regulator Co., G. M. 92
Detroit Lubricator Co. 19
Dole Valve Co. 23
Dunham Co., C. A. 91

Economy Pumping Machinery Co. 99
Elliott Co. 89
Excelso Specialty Works 15

Fleisher-Sturtevant Co. 27

Garden City Fan Co. 86
Gleockle, Jr., A. F. 105
Gorton & Lidgerwood Co. 24
Griscom-Russell Co. 12
Gurney Heater Mfg. Co. 103, 105

Haines & Co., Wm. S. 93
Hartmann Co., Chas. 93
Healy-Ruff Co. 87
Heating & Power Appliance Co. ... 94
Heating Specialty Co. 88
Herbert Boiler Co. 10
Hersh Bros. Co. 76
Hoffman Specialty Co. 108
Honeywell Heating Specialty Co. 103
Hornung, J. C. 93
Hotstream Heater Co. 98
Hydro-High Vacuum Pump Co. 28

Ilg Electric Ventilating Co. 74
Illinois Engineering Co. 30
Illinois Malleable Iron Co. 8
International Heater Co. 6

Jenkins Bros. 95
Johnson Service Co. 32

Kennedy Valve Co. 95
Kewanee Boiler Co. 5
Knowles Mushroom Ventilator Co. 82

Marsh & Co., Jas. P. 3
Marsh Valve Co. 90
Mason Regulator Co. 90
Massachusetts Blower Co. 84
McAlear Mfg. Co. 30
Mouat-Squires Co. 26
Mueller Mfg. Co. 13

Nash Engineering Co. 72
National Regulator Co. 12
Nelson Corp., H. W. 25
New York Blower Co. 81

O-E Specialty Mfg. Co. 95
Oil City Boiler Works 4

Page Boiler Co. 6
Patterson-Kelley Co. 14
Peerless Engineering Co. 103
Peerless Unit Ventilator Co. 3
Pierce, Butler & Pierce 8
Porbeck Mfg. Co. 80
Powell Co., Wm. 90
Powers Regulator Co. 87

Ric-Wil Co. ..... Front Cover
Ross Heater & Mfg. Co. 86
Russell, W. A. & Co. 18

Sarco Co. 24
Schaeffer & Budenberg Mfg. Co. 91
Seymour, James M. 87
Simmons Co., John 106
Simplex Heating Specialty Co. 95
Skidmore Corp. 96
Skinner Bros. Mfg. Co. 107
Spencer Turbine Co. 32
Sprague Electric Works 78
Standard Thermometer Co. 88
Sterling Engineering Co. 94
Sturtevant Co., B. F. 79

Thompson Mfg. Co. 96
Titusville Iron Works Co. 4
Trane Co. 29
Twin Fire Furnace Co. 98

Utica Heater Co. 101

Webster & Co., Warren 22
Western Engineering Co. 97
Westinghouse Elec. & Mfg. Co. ... 83
Whitlock Coil Pipe Co. 10
Wing Mfg. Co., L. J. 92
Wright-Austin Co. 93
Wyckoff & Son Co., A. 89

Yeomans Bros. Co. 97
Young Pump Co. 97

JOHN SIMMONS CO

110 CENTRE STREET
NEW YORK

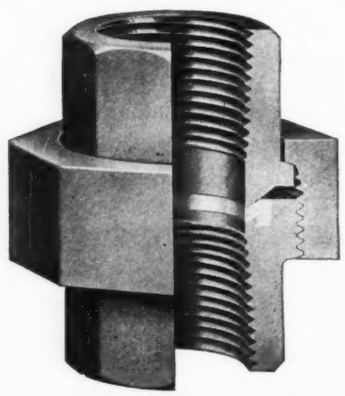
SIMMONS' MALLEABLE BRONZE SEAT UNION

The UNION You Have Been Waiting For

This UNION has a bronze metal immovable ring seat.

Corrosion and rust do not affect it.

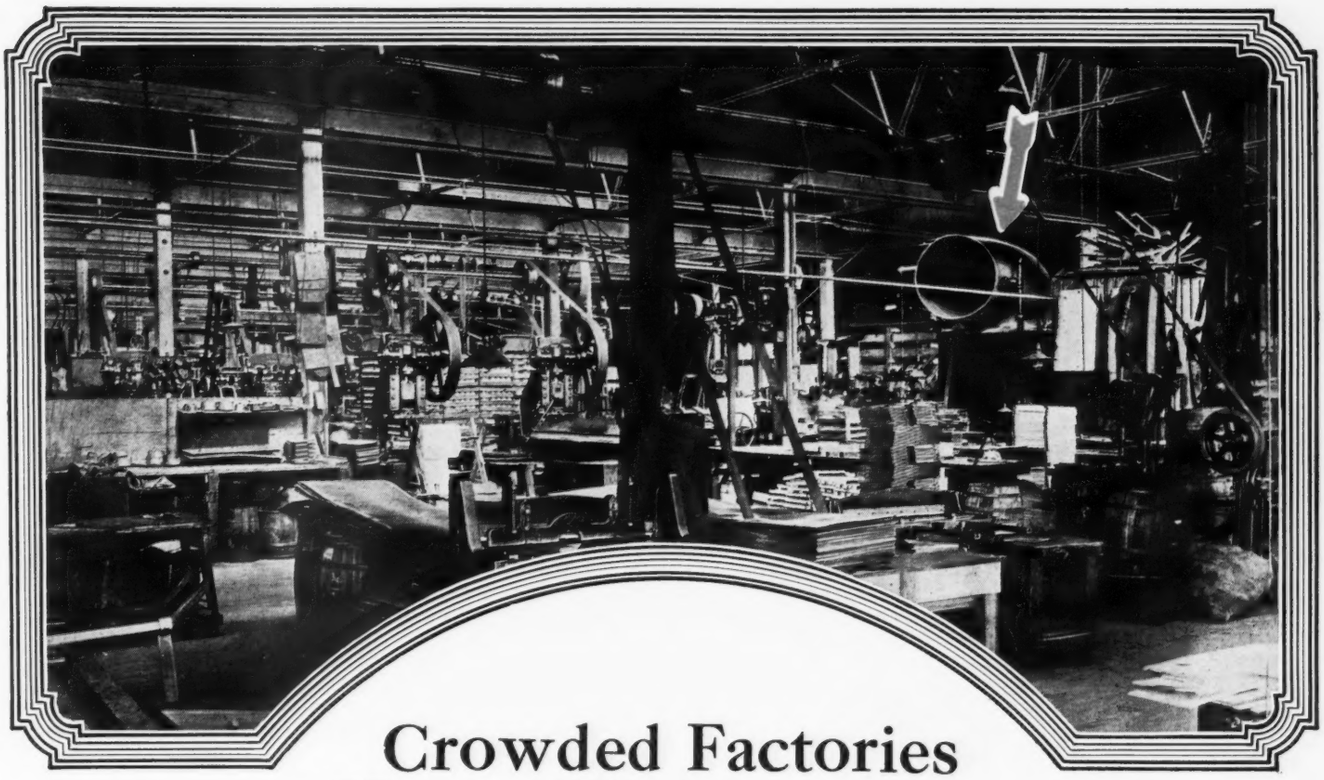
Has no iron-to-iron contacts.



No union, regardless of weight, in actual use or test, will stand greater pressure or strain.

The joints are ball shape and ground to fit.

PERFECT CONTRACT OF ENTIRE SURFACE—NO GASKETS OR LEAD NEEDED
Designed for Working Pressures up to 250 Lbs.
EVERY UNION Tested Before Leaving Our Factory
All Sizes in Stock from 1/8" to 3" **Prices on Request**



Crowded Factories Heated Without Pipes or Ducts

The Skinner Bros. (Baetz Patent) Heating System uses no distributing pipes or ducts—it does not clutter up your factory space with unsightly pipes that shut off the light.

The Skinner System keeps every part of your plant or factory building at a comfortable working temperature regardless of weather conditions, building construction or exposure. It supplies pure fresh air in practically any volume desired—in the summer it operates very effectively as a ventilator as well.

The Pioneer Ductless Heating System

Skinner Bros. are pioneers in the field of ductless heating and their long experience in the design and construction of this type of apparatus has developed many exclusive and distinct features which add to heating efficiency.

Every Skinner Bros. (Baetz Patent) heater is fully guaranteed when installed as directed by our Engineers. We will gladly send you full information about this heater together with names of users, should you care to make your own investigation.

Type SC—Where Steam is Available

Consists of a series of steam coils compactly mounted in an enclosed case, above a powerful fan-wheel. Cold air at the floor level or from outside is drawn into the heater by the fan, heated, and then distributed through outlet hoods to every corner of the open space. Uses live or exhaust steam. Fan operated by any power available.

Type DF—Where Steam is Not Available

Construction is similar to that of Type SC, except that steam coils are replaced by a heavy cast iron fire-pot. Burns coal, coke, wood, oil or gas—no more trouble than an ordinary furnace. Cold air is forced around the surface of the heated fire-pot and then gently diffused through outlet hoods into the open building space.

SKINNER BROS. MFG. CO., Inc.

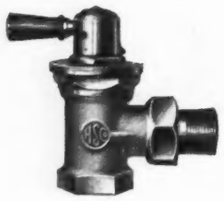
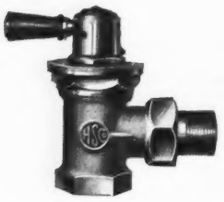
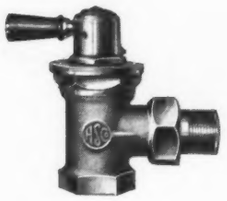
1426 So. Vandeventer Ave., St. Louis, Mo.

Factories; St. Louis, Mo. and Elizabeth, N. J.

Boston, 455 Little Bldg.
Buffalo, 712 Morgan Bldg.
Chicago, 1713 Fisher Bldg.
Cincinnati, Ohio
Cleveland, 622 Marshall Bldg.
Detroit, 318 Scherer Bldg.
Kansas City, 337 Lee Bldg.
New York, 1712 Flatiron Bldg.
Pittsburgh, 8 Wood Street
San Francisco, Monadnock Block
Spokane, 419 First Ave.
Washington, D.C. 724 Evans Bldg.

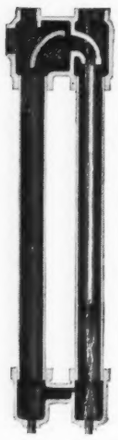
Skinner Bros.

BAETZ PATENT HEATING SYSTEM

HOFFMAN
"CONTROLLED HEAT"
IS POSITIVE

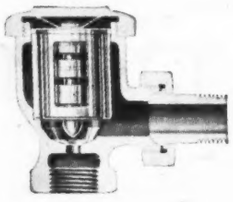
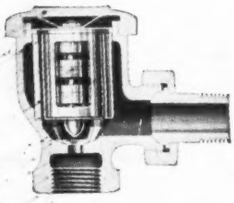
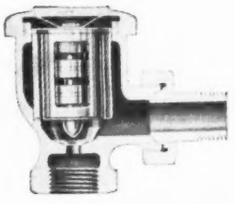
The Hoffman No. 7 Adjustable Modulating Valve Accurately controls the amount of steam admitted to each radiator. It modulates.



The Hoffman No. 8 Return Line Valve controls the radiator outlet, discharging all air and condensation without steam loss.

The Hoffman Differential Loop controls the boiler water line, holding it constant under all pressures. "Controlled Heat" means "Conserved Coal."

Specify these reliable positive-acting five year guaranteed specialties.

HOFFMAN SPECIALTY COMPANY
WATERBURY, CONN.

Boston Philadelphia Minneapolis
New York Chicago Los Angeles